LASER PRINTER

SERVICE MANUAL

MECHANICS & ELECTRONICS

PREFACE

This service manual contains basic information required for after-sales service of the laser printer (here-in-after referred to as "this machine" or "the printer"). This information is vital to the service technical in maintaining the high printing quality and performance of the printer.

This service manual covers both HL-630 / HL-631/ HL-641,645 / 650 / 655M.

This manual consists of the following chapters:

CHAPTER I : FEATURES AND SPECIFICATIONS

Features, specifications, and operation.

CHAPTER II : THEORY OF OPERATION

Basic operation of the mechanical system, the electrical system and the electrical circuit, and their timing.

CHAPTER III : DISASSEMBLY AND REASSEMBLY

Procedures of disassembling and reassembling the mechanical system.

CHAPTER IV : TROUBLESHOOTING

Reference values and adjustment, troubleshooting for image defects, troubleshooting for malfunctions, etc.

Information in this manual is subject to change due to improvement or re-design of the product. All relevant information in such cases will be supplied in service information bulletins (Technical Information).

A through understanding of this printer, based on information on this service manual and service information bulletins, is required for maintaining its quality performance and fostering the practical ability to find the cause of troubles.

CONTENTS

CHAPTER I FEATURES AND SPECIFICATIONS

1 FEATURES I-1

2 SPECIFICATIONS I-2

2.1 Printing I-2
2.2 Functions I-2
2.3 Electrical and Mechanical I-2
2.4 Paper Specification I-4
2.5 Print Delivery I-4
2.6 Paper I-4
2.7 Effective Printing Area I-5

3 SAFETY INFORMATION I-7

3.1 Laser Safty (110 - 120V Model only) I-7
3.2 CDRH Regulations (110 - 120V Model only) I-7
3.3 Caution for Laser Product I-8

CHAPTER II THEORY OF OPERATION

1 ELECTRONICS II-1

1.1 General Block Diagram II-1
1.2 Main PCB Block Diagram II-2
1.3 Main PCB II-3
1.3.1 CPU II-3
1.3.2 ASIC II-4
1.3.3 ROM II-7
1.3.4 RAM II-7
1.3.5 Optional RAMs II-8
1.3.6 Optional Serial I/O II-8
1.3.7 EFPROM II-9
1.3.8 Reset Circuit II-9
1.3.9 CDCC I/O II-9
1.3.10 Engine I/O II-10
1.4 Driver PCB II-11
1.4.1 Paper Feed Motor Drive Circuit II-11
1.4.2 Solenoid (Pick-up,Clutch), Erase Lamp, Fan Motor Drive Circuit II-11
1.4.3 Operation Panel II-12
1.4.4 Scanner Motor, Laser Sensors(Registration, Paper Eject, Toner), Thermistor, High-voltage Power Supply II-12
1.5 Power Supply II-13

2 MECHANICS II-14

2.1 Overview of printing mechanism II-14
2.2 Paper Transfer II-15
2.2.1 Paper Supply II-15
2.2.2 Paper Registration II-15
2.2.3 Paper Eject II-16
2.3 Sensors II-17
2.3.1 Multi Purpose Tray (MPT) Sensor II-17
2.3.2 Cover Sensor II-17
2.3.3 Toner Empty Sensor II-17
2.4 Process Unit II-18
2.4.1 Photosensitive Drum II-18
2.4.2 Primary Charger II-18
2.4.3 Developer Roller II-18
2.4.4 Transfer Roller II-18
2.4.5 Cleaner Blade II-18

2.4.6 Toner Auger II-18
2.4.7 Erase Lamp II-18
2.5 Print Process II-18
2.5.1 Charging II-18
2.5.2 Exposure Stage II-19
2.5.3 Developing II-20
2.5.4 Transfer II-20
2.5.5 Drum Cleaning Stage II-21
2.5.6 Erasing Stage II-21

CHAPTER III DISASSEMBLY AND REASSEMBLY

1 SAFETY PRECAUTIONS III-1
2 DISASSEMBLING FLOW III-2
3 DISASSEMBLING PROCEDURE III-3
3.1 Multi-purpose Paper Tray III-3
3.2 Process Unit III-3
3.3 Top Cover III-4
3.4 Main Cover III-5
3.5 Upper Shoot Cover III-6
3.6 Fixing Unit III-6
3.7 Scanner Unit III-7
3.8 Fan Guard III-7
3.9 Interlock Levers III-8
3.10 Fan Motor III-8
3.11 Registration Sensor PCB III-8
3.12 Solenoid P III-9
3.13 Gear Shaft Plate III-9
3.14 Gears III-10
3.15 Main Motor Unit III-11
3.16 Solenoid C III-11
3.17 Main PCB III-12
3.18 Base Plate III-12
3.19 Driver PCB III-14
3.20 Power Supply PCB III-14
3.21 High-voltage Power Supply III-15
3.22 Tray Extention III-15
3.23 Paper Eject Tray III-16
3.24 Filter Cover III-16
4 PACKING III-17

CHAPTER IV TROUBLE SHOOTING

1 INTRODUCTION IV-1
1.1 Initial check IV-1
1.2 Basic Procedure IV-2
2 IMAGE DEFECTS IV-3
2.1 Image Defect Example IV-3
2.2 Troubleshooting Image Defect IV-4
3 TROUBLESHOOTING OF MALFUNCTIONS IV-12
4 INSPECTION MODE IV-17
4.1 Inspection mode 1 ..... IV-17
4.2 Inspection Pattern 1 ..... IV-17
4.3 Inspection mode 2 ..... IV-19
4.4 Initialization of NV-RAM IV-19
4.5 Error codes IV-20

CHAPTER I FEATURES AND SPECIFICATIONS

1 FEATURES

This printer has the following features:

300dpi Resolution and 6ppm Printing Speed

300 dots per inch (dpi) with microfine toner and six pages per minute (ppm) printing speed (Letter paper).

Versatile Paper Handing

The printer has a multi-purpose sheet feeder and straight paper path mechanism. Using this mechanism, you can load A4, letter, legal, B5, A5 and executive size of paper, and various types of paper including envelopes, postcard, organizer paper, and your custom paper size. The multi-purpose sheet feeder also allows manual paper loading, so you can also use labels.

Remote Printer Console Program for DOS

The utility program, Remote Printer Console, is available on the floppy disk supplied with your printer. When you operate your computer in the DOS (Disk Operating System) environment, this allows you to easily change the default setting of the printer such as fonts, page setup, emulations and so on. This program also provides a status monitor program, which is a Terminate-and-Stay Resident (TSR) program. It can monitor the printer status while running in the background and report the current status or errors on your computer screen.

Popular Printer Emulation Support

This printer supports three printer emulation modes, HP LaserJet IIP, Epson FX-850, and IBM Proprinter XL. When you use DOS application software or Windows™ version 3.0 or earlier, you can use any of these emulations to operate the printer. The printer also supports Auto-emulation switching between HP and Epson or HP and IBM. If you want to fix the printer emulation, you can do it using the Remote Printer Console Program.

Bi-Directional Parallel Interface

The parallel interface of this printer allows bi-directional communication with a computer. This interface allows the printer to communicate back to the computer useful information such as the amount of memory installed, and other printer setup conditions. As the supplied Remote Printer Console program or Windows™ 3.1 driver supports the bi-directional mode, they can both report the printer status.

Optional Macintosh Interface (Standard in some countries)

The optional Macintosh serial interface kit is available with a driver, which allows your printer to be connected to Macintosh computers. With this option, you can use your printer with both an IBM PC, or its clone, and a Macintosh at the same time. This optional interface board can be used as a RS-422A interface for Macintosh or a RS-232C serial interface for IBM PC or compatible.

Enhanced Memory Management

The printer has it's own data Compression Technology, which can automatically compress graphic data and downloaded font data efficiently into the printer memory . You can avoid memory errors and print most fullpage 300 dpi graphic and text data, including large fonts, with printer's standard memory.

2 SPECIFICATIONS

2.1 Printing

Print Method	Electrophotography by semiconductor laser beam scanning
Resolution	300 dots/inch
Print Speed	6 page/minute (when loading Letter-size paper from the multi-purpose sheet feeder)
Warm-Up	Max. 1 minute at 23°C (73.4°F)
First Print	20 seconds (when loading Letter-size paper from the multi-purpose sheet feeder)
Print Media	Toner in a cartridge Life Expectancy: 3,000 pages/cartridge (when printing A4 or letter -size paper at 4% print coverage)
Developer	Drum unit, separated from toner cartridge (when printing A4 or letter -size paper at 4% print coverage in continuous printing.)
Download Fonts	Acceptable
True Type Fonts on disks	True Type™-compatible soft-fonts for Windows™ on supplied disk

2.2 Functions

CPU	MC68EC000 16 MHz
Emulation	Automatic emulation selection among HP LaserJet IIP, EPSON FX-850, and IBM Proprinter XL
Printer Driver	Windows™ 3.1 driver, supporting Brother Native Compression mode and bi-directional capability. Optional Macintosh® QuickDraw driver (Standard in some countries.)
Interface	Bi-directional Centronics parallel. RS-422A/RS-232C serial interface is optionally available. (The serial interface is a standard in some countries.)
Memory	1.0 or 2.0 MB (subject to the printer model) with Data Compression Technology. Expandable up to 2.0 MB with the optional memory board.
Control Panel	2 switches and 4 lamps
Diagnostics	Self-diagnostic program

2.3 Electrical and Mechanical

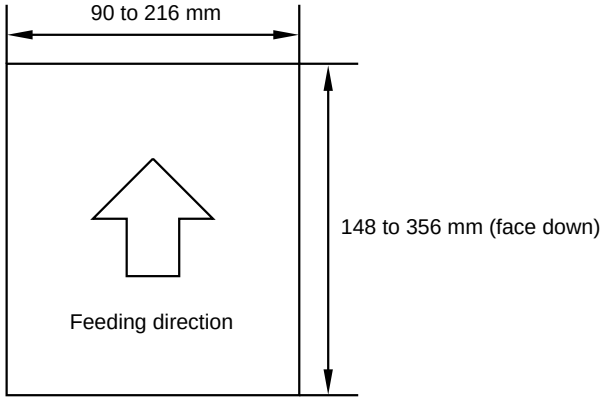
Power Source	U.S.A. and Canada :	AC 110 to 120 V, 60Hz
	Europe and Australia:	AC 220 to 240 V, 50Hz
Power Consumption	Printing:	480 W or less
	Standing by:	60 W or less
	Sleep:	10 W or less
Noise	Printing:	50 dB A or less
	Standing by:	38 dB A or less

Temperature	Operating:	10 to 32.5°C (59 to 90.5°F)
	Storage:	0 to 40° C (38 to 104°F)
Humidity	Operating:	20 to 80% (without condensation)
	Storage:	20 to 80% (without condensation)
Dimensions (W x H x D)	357(W) 351(D) 192(H) mm (when the output tray is closed and the Multi-purpose sheet	

2.4 Paper Specification

(1) Multi-purpose tray loading

Paper size: A4, Letter, Legal, B5, A5, and Executive, and other sizes of paper that can be handled by the feed mechanism, can be loaded.



Feedable paper type	:	60 (16 lb.) to 135 (36 lb.)g/m2
Maximum load height	:	22 mm (200 sheets of 75 g/m^2 paper) letter size
Envelopes	:	10 envelopes
Setting method	:	Pull the manual paper tray toward you, insert the sheaf of paper into the tray, alining the top edge of the sheets, then push the tray back to its original position.

(2) Manual paper loading

The manual paper loading takes priority of feeding and a single sheet of paper can be fed into the printer.
The applicable sizes and types of paper are the same as the multi-purpose tray loading above in specification.

2.5 Print delivery

(1) At the print delivery tray opened

Tray capacity : Maximum 100 sheets (75g/m^2), face-down only

(2) At the print delivery tray closed

Tray capacity : 1 sheet (75 g/m^2), face-down only

Note) Face down : Deliver the printed face of the paper downward.
Environment : 23°C

2.6 Paper

(1) Types of paper

(a) Normal paper (60 to 135 g/m^2, specified types of high-quality paper)

- A4 size
- Letter size
- Legal size
- B5 size
- A5 size
- Executive size

* The specified types of plain paper are as follows:
Letter : Xerox 4024 (75 g/m^2)
A4 : Mitsubishi PPC paper (64 g/m^2), Multi Copy (80 g/m^2)

(b) Special paper (specified types)

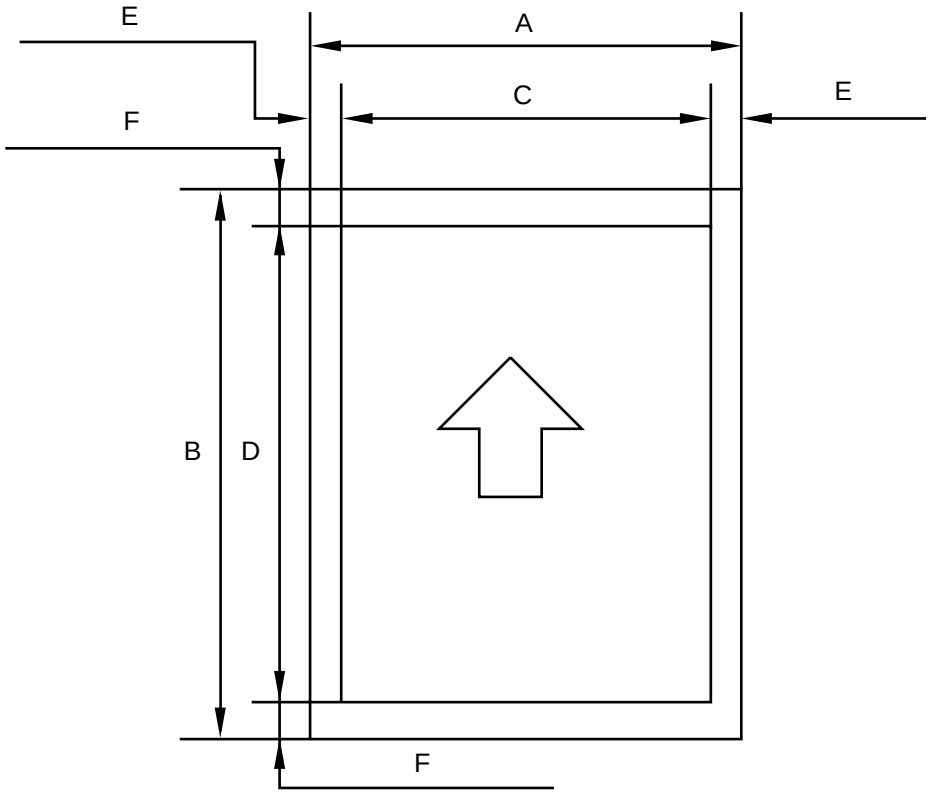
- Labels
- Envelopes (DL, C5, COM10)
- Postcards
- Organizers (K, L, and M sizes of DAY-TIMERS)

(2) Paper feed conditions

Type	Name	Tray feed	Manual feed
Normal paper (cut sheet)	60 to 135 g/m^2 paper	○	○
Special paper (cut sheet)	Labels		○
	Envelopes	○	○
	Postcards	○	○
	Organizers	○	○

2.7 Effective printing area

Printable area



The effective printing area means the area within which the printing of all the data received without any omissions can be guaranteed.

The table below shows the effective printing areas.

SIZE	A	B	C	D	E	F
A 4	210.0mm (2,480 dots)	297.0mm (3,507 dots)	203.2.0mm (2,400 dots)	288.5mm 11.36" (3,408 dots)	3.4mm (40 dots)	4.23mm (50 dots)
Letter	215.9mm 8.5" (2,550 dots)	279.4mm 11.0" (3,300 dots)	207.5mm 8.0" (2,400 dots)	288.5mm 10.67" (3,200 dots)	6.35mm (75 dots)	↑
Legal	215.9mm 8.5" (2,550 dots)	355.6mm 14.0" (4,200 dots)	207.5mm 8.0" (2,400 dots)	288.5mm 10.67" (3,200 dots)	↑	↑
B 5	182.0 mm	257.0 mm	173.5 mm	248.5 mm	6.01mm (71 dots)	↑
Executive	184.15mm 7.25" (2,175 dots)	266.7mm 10.5" (3,150 dots)	175.7mm 6.92" (2,400 dots)	258.2mm 10.17" (3,200 dots)	6.35mm (75 dots)	↑
A 5	148.5mm (1,754 dots)	105.0mm (1,240 dots)	(1,654 dots)	(1,140 dots)	↑	↑
Organizer (K size)	95.25mm 3.75" (1,125 dots)	171.45mm 6.75" (2,025 dots)	86.78mm 3.42" (1,025 dots)	162.98mm 6.42" (1,925 dots)	↑	↑
Organizer (L size)	139.7mm 5.5" (1,650 dots)	215.9mm 8.5" (2,550 dots)	131.23mm 5.17" (1,550 dots)	207.43mm 8.17" (2,450 dots)	↑	↑
COM-10	104.78mm 4.125" (1,237 dots)	241.3mm 9.5" (2,850 dots)			↑	↑
MONARCH	98.43mm 3.875" (1,162 dots)	190.5mm 7.5" (2,250 dots)			↑	↑
C 5	162mm (1,913 dots)	229mm (2,704 dots)			6.01mm (71 dots)	↑
DL	110mm (1,299 dots)	220mm (2,598 dots)			↑	↑

(Note that the paper sizes indicated here should conform to the nominal dimensions specified by JIS.)
A4 paper must accommodate 80 characters printed in pica pitch (203.2 mm).

	feeder is removed.)
Weight	Approx. 7kg (15.4 lb.)

3 SAFETY INFORMATION

3.1 Laser Safety (110 - 120V Model only)

This printer is certified as a Class 1 laser product under the US Department of Health and Human Services (DHHS) Radiation Performance Standard according to the Radiation Control for Health and Safety Act of 1968. This means that the printer dose not produce hazardous laser radiation.

Since radiation emitted inside the printer is completely confined within the protective housings and external covers, the laser beam cannot escape from the machine during any phase of user operation.

3.2 CDRH Regulations (110 -120 V Model only)

The Center for Device and Radiological Health (CDRH) of the US Food and Drug Administration implemented regulations for laser products on August 2, 1976. These regulations apply to laser products manufactured from August 1, 1976. Compliance is mandatory for products marketed in the United States. The label shown below indicates compliance with the CDRH regulations and must be attached to laser products marketed in the United States.

MANUFACTURED : K
BROTHER INDUSTRIES, LTD.
15-1, Naeshiro-cho, Mizuho-ku Nagoya 467, Japan.
This product conforms with CDRH radiation
performance standard 21 CFR chapter 1
subchapter J.

Fig. 1.1

3.3 Caution for Laser Product

(1) CAUTION: When the machine during serving is operated with open cover, the regulations of VBG 93 and the performance instructions for VBG 93 are valid.

(2) CAUTION: In case of any trouble with the laser unit, please replace the laser unit itself. To prevent direct exposure to the laser beam, do not try to open the enclosure of laser unit.

(3) Location of the Exit Opening of Laser Beam.

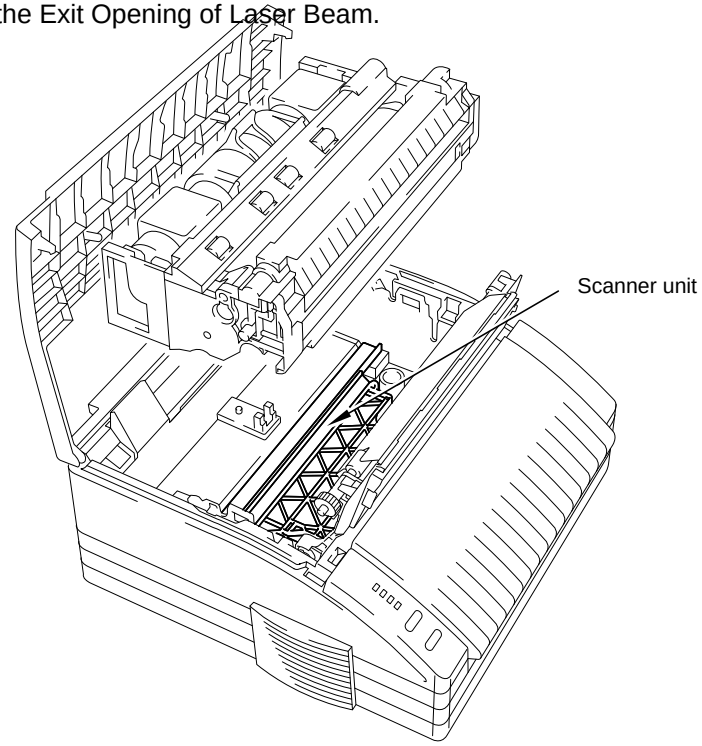


Fig. 1.2

(4) Location of Caution Label for Laser Product.

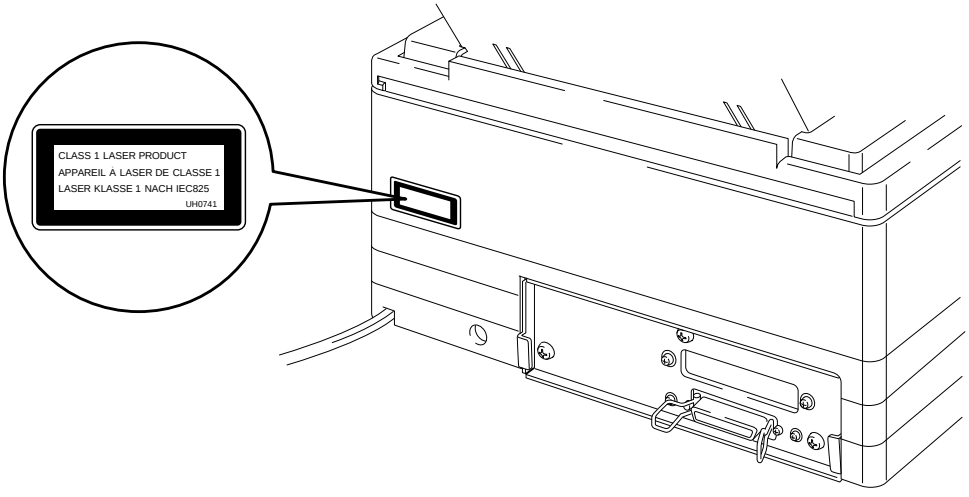


Fig. 1.3

CHAPTER II THEORY OF OPERATION

1. ELECTRONICS

1.1 General Block Diagram

Fig. 2.1 shows a general block diagram of this printer.

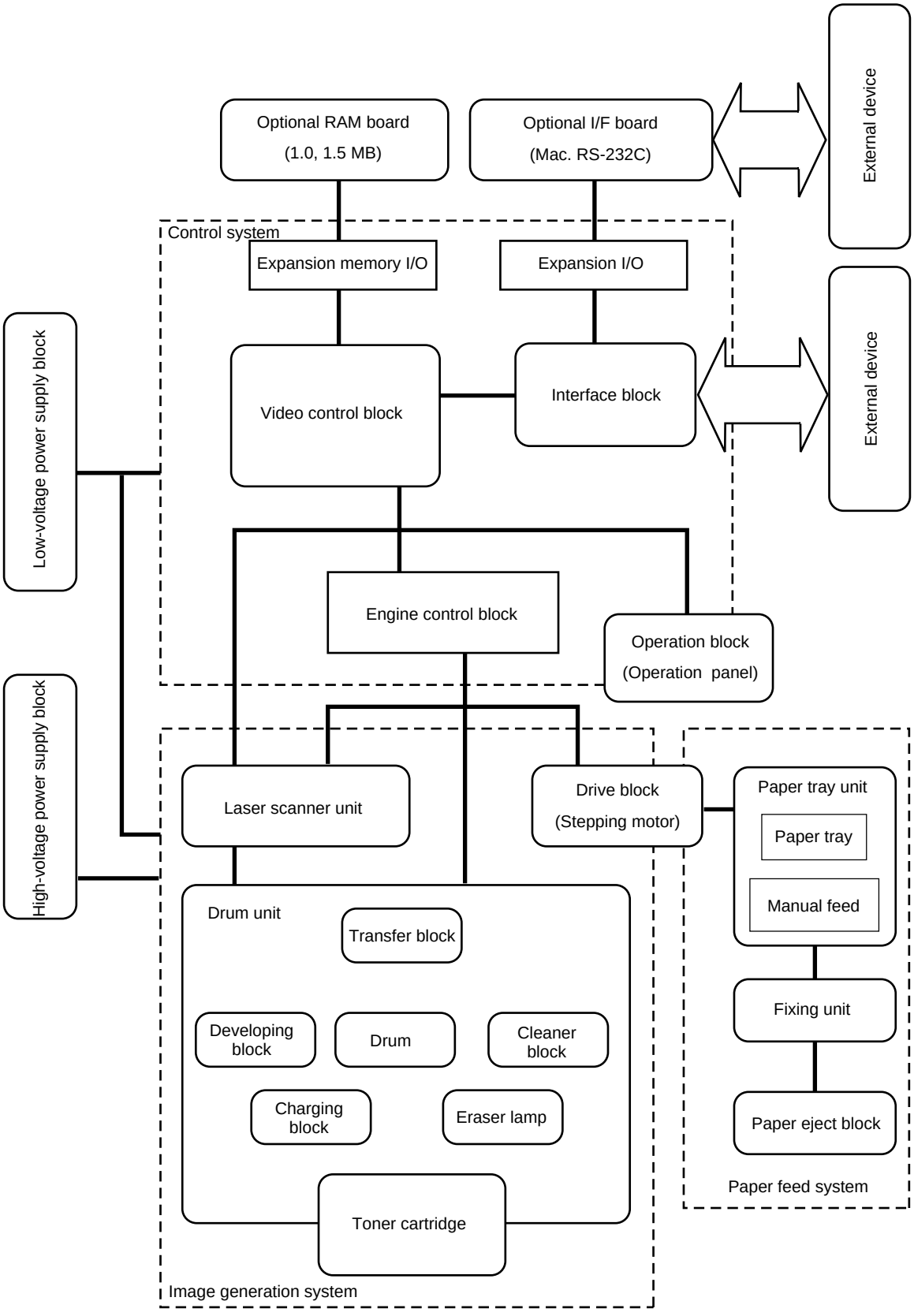


Fig. 2.1 General Block Diagram

1.2 Main PCB Block Diagram

Fig. 2.2 shows a block diagram of the main PCB.

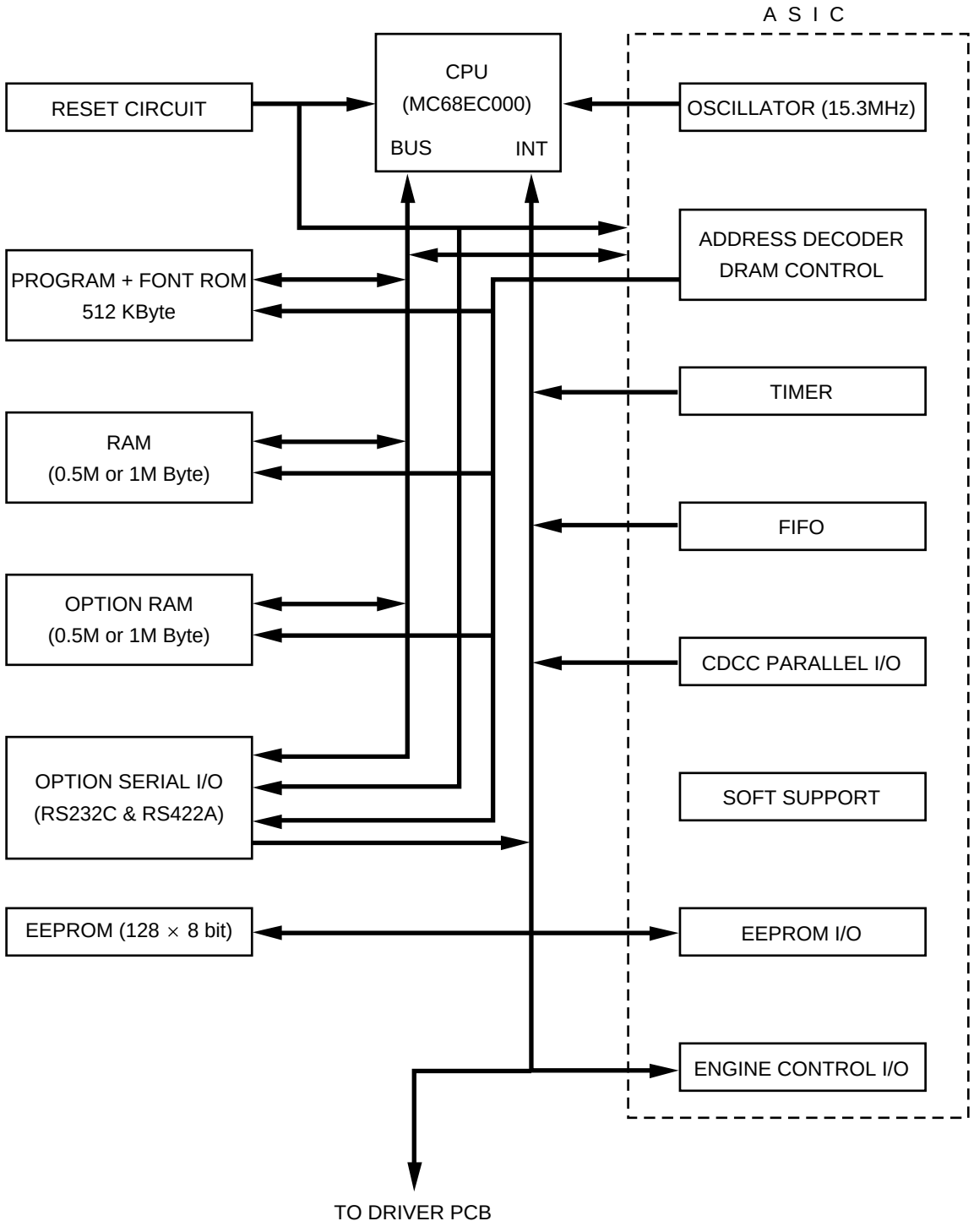


Fig. 2.2 Main PCB Block Diagram

1.3 Main PCB

1.3.1 CPU

The CPU is a Motorola MC68EC000FN16 which is driven with a clock frequency of 15.3 MHz. This clock frequency is made by dividing the source clock of 30.67 MHz into two. The address bus is 23 bits of A1 to A23, and the data bus is 16 bits. The total memory space is 16 MBytes.

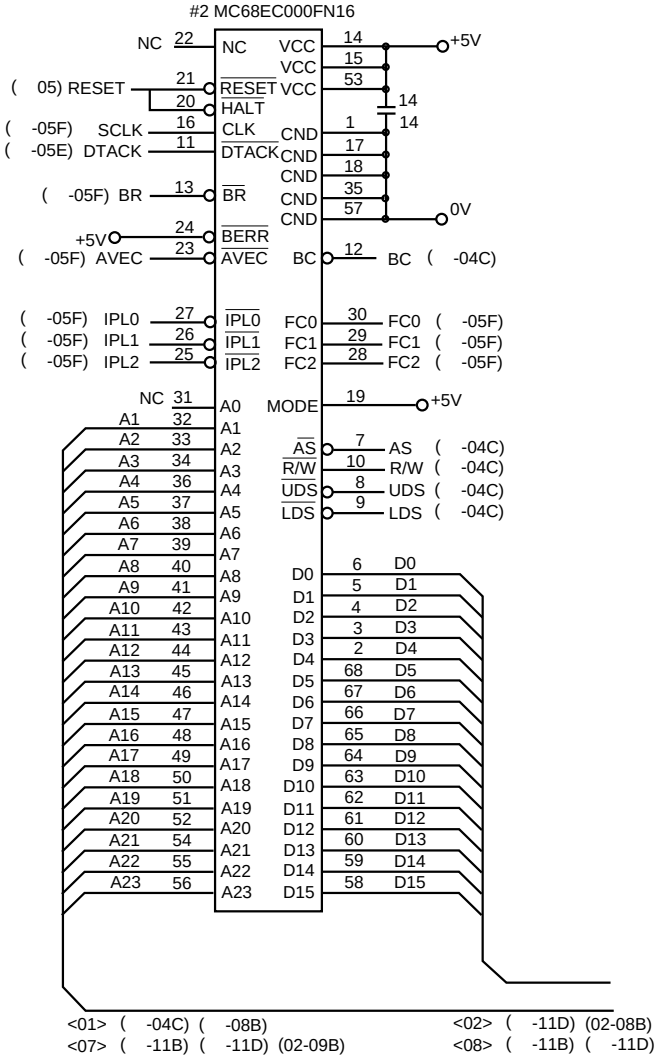


Fig. 2.3

1.3.2 ASIC

(1) Oscillator circuit
Generates the main clock for the CPU by deviding the source clock frequency into two.

(2) Address decoder
Generates the CS for each device.

(3) DRAM control
Generates the RAS, CAS, WR, OE and MA signals for the DRAM and controls refresh processing (CAS before RAS self-refreshing method).

(4) Interrupt control
Interrupt levels:

Priority High	7	NMI
	6	FIFO
	5	Timer1
	4	BD
	3	EXINT (Option Serial I/O)
	2	CDCC
Low	1	Timer2

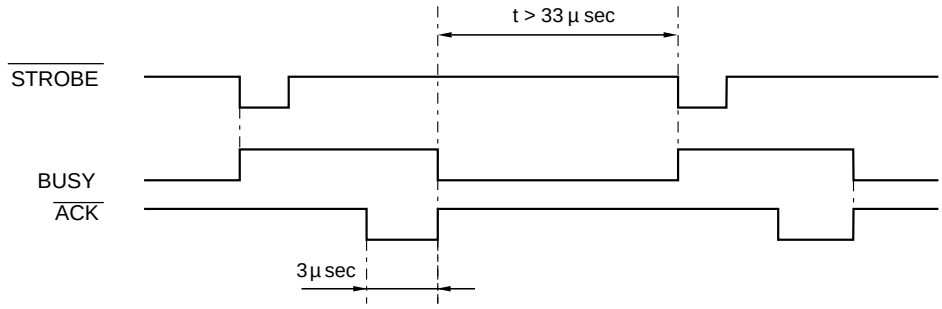
(5) Timers
The following timers are incorporated:

Timer 1	16-bit timer
Timer 2	10-bit timer
Timer 3	Watch-dog timer 1
Timer 4	Watch-dog timer 2

(6) FIFO
A 2,560-bit FIFO is incorporated. Data for one raster is transfered from the RAM to the FIFO by DMA transmission and is out put as serial video data. The data cycle is 1.53 MHz.

(7) CDCC parallel I/O
CDCC data is received in 4-byte units by DMA transmission. If data of less than 4 bytes remains, a time-out occurs and it is forcibly transferred by DMS transfer.

Low Speed Mode



High Speed Mode

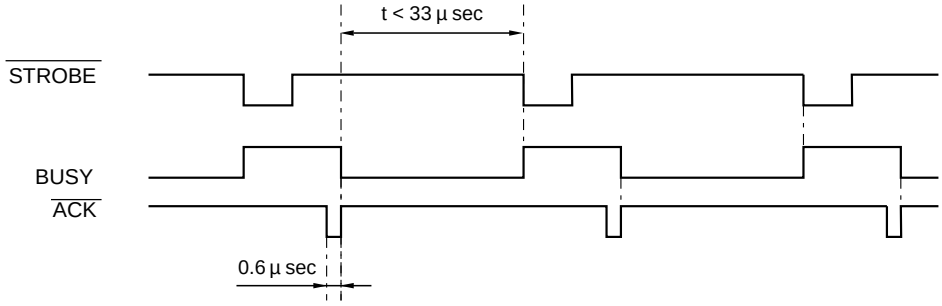


Fig. 2.4

The default setting is "AUTO MODE", which means that the time between the falling edge of the BUSY signal and the rising edge of the STROBE signal is measured, and if it is longer than about 33 μ sec, the mode is automatically switched to the LOW SPEED MODE; if it is shorter, the mode is automatically switched to the HIGH SPEED MODE.

It is also possible to fix the mode to the LOW SPEED MODE by sending a command from the PC to rewrite the contents of the NV-RAM.

BUSY goes HIGH at the falling edge of STROBE.

The data (8-bit) from the PC is latched in the ASIC at the rising edge of STROBE.

The pulse width of ACK differs according to the MODE, as shown above.

(8) Software support
Supports 16 x 16 rotation, bit expansion, and floating decimal point calculations.

(9) EEPROM I/O
One output port and one I/O port are assigned.

(10) Engine control I/O

This I/O is for connection to the driver PCB. It controls the motors, solenoids, sensors, etc.

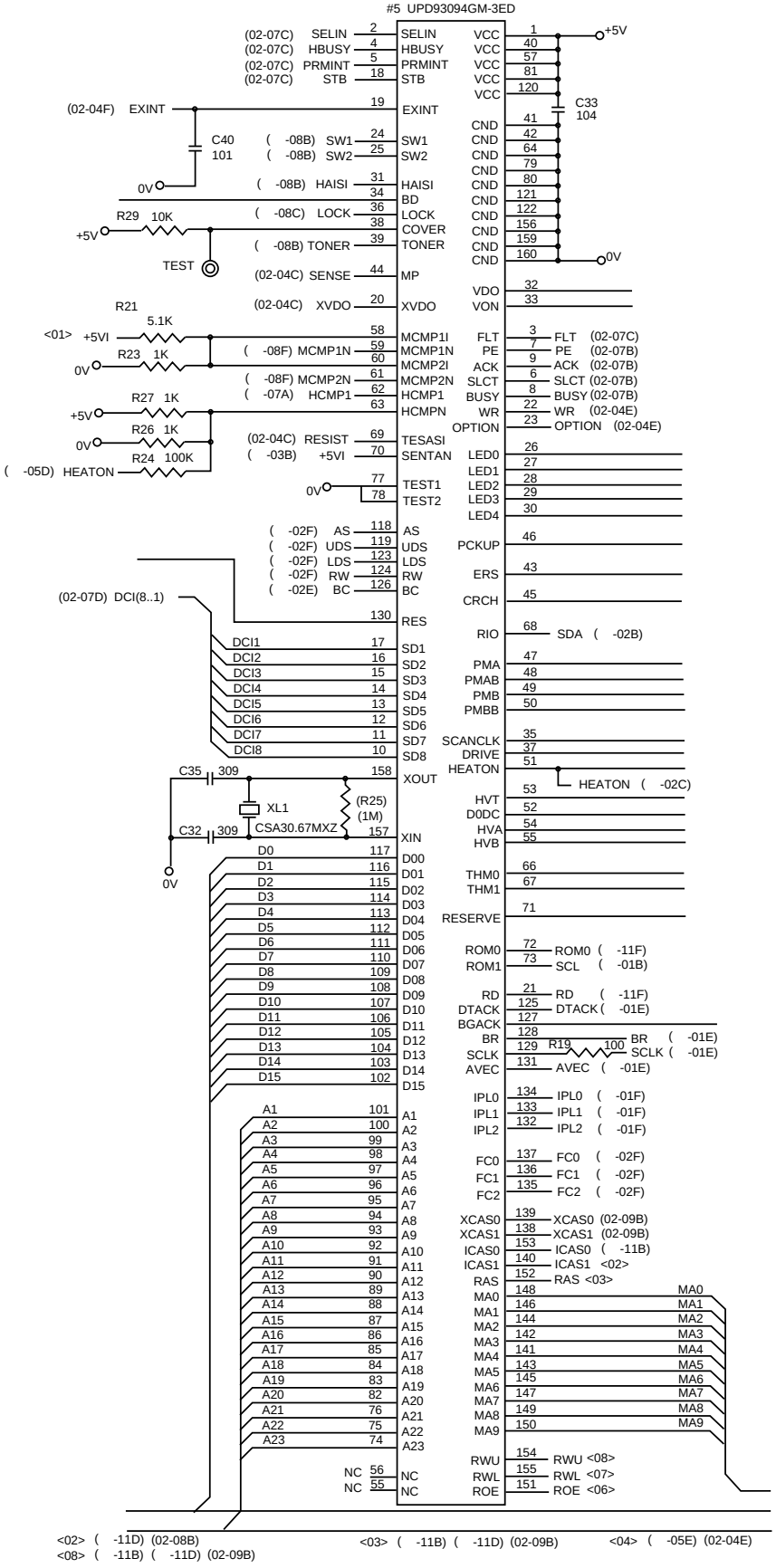


Fig. 2.5

1.3.3 ROM

A program of 512 Kbytes and the font data are stored in the ROM.
A 42-pin IC socket is provided: an 8 Mbit ROM (42-pin) can be mounted to this socket normally, but a 4 Mbit ROM (40-pin) must be mounted to leave the 1st and 42nd pins of the socket opened.

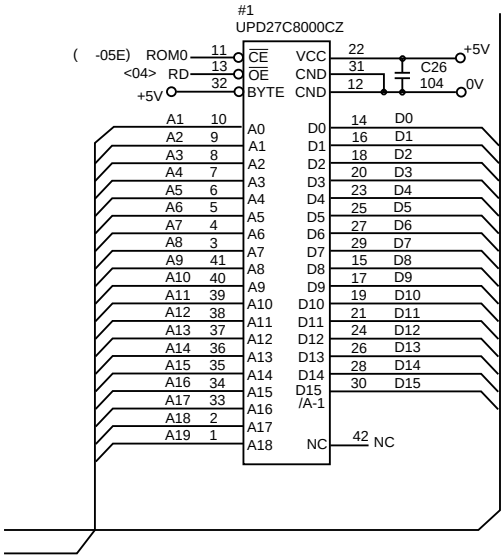


Fig. 2.6

1.3.4 RAM

A 4-Mbit DRAM (x 16 bits) is used as the RAM. Depending on the specification, There are two models: the 0.5 M model (one mounted), or the 1 M model (two mounted).

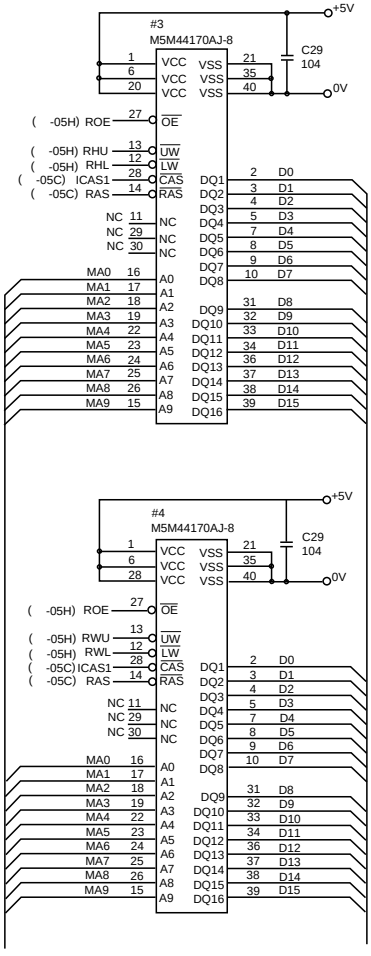


Fig. 2.7

1.3.5 Optional RAMs

There are two types of optional RAM: the 1 Mbyte model and the 1.5 Mbyte model, but even if the 1.5 Mbyte model is mounted in addition to a 1 M mode, only 2 Mbytes in total will be recognized.

0.5 M model + 1 M optional RAM ⇒ 1.5 Mbytes
0.5 M model + 1.5 M optional RAM ⇒ 2 Mbytes
1 M model + 1 M optional RAM ⇒ 2 Mbytes
1 M model + 1.5 M optional RAM ⇒ 2 Mbytes

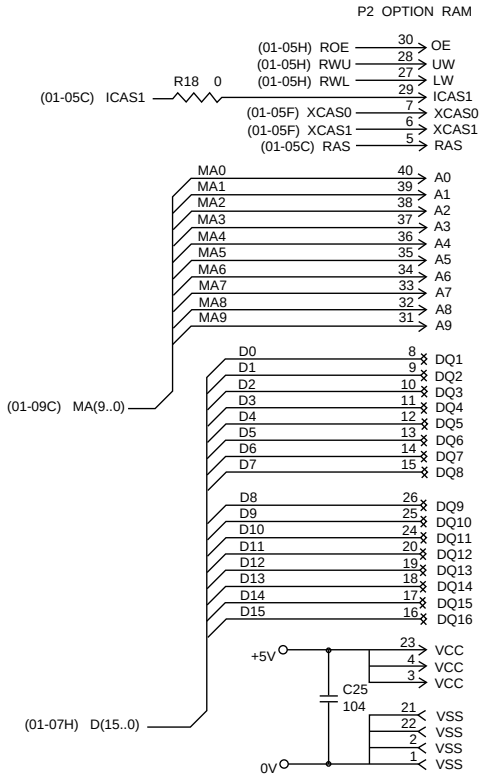


Fig. 2.8

1.3.6 Optional Serial I/O

The interrupt of serial I/O are input to the EXINT terminal of the ASIC, and are recognized by the CPU. A 32-byte space for register is provided for this I/O, which are read and written to by the CPU.

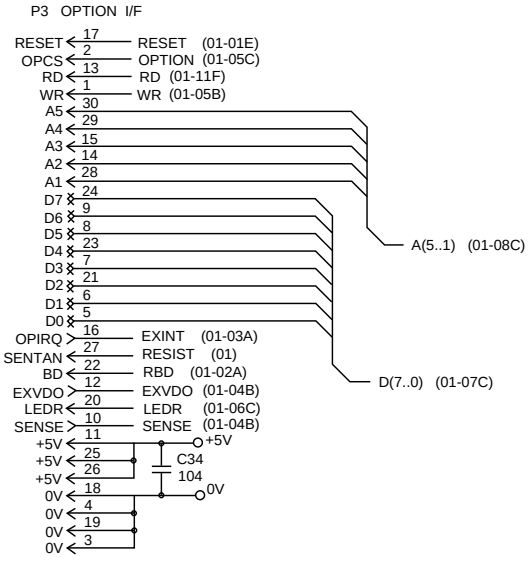


Fig. 2.9

1.3.7 EEPROM

The EEPROM is X24CO1A type of a two-wire method with a 128 x 8 bit configuration.

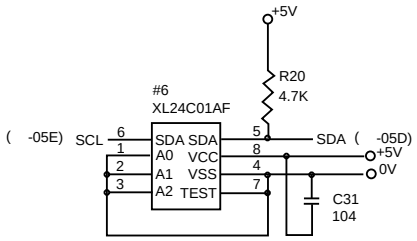


Fig. 2.10

1.3.8 Reset circuit

The reset IC is PST593DMT.
The reset voltage is 4.2 V (typ.) and the LOW period of reset is 200 ms (typ.).

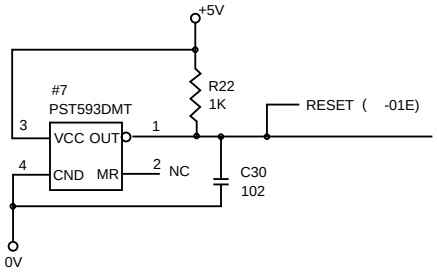


Fig. 2.11

1.3.9 CDCC I/O

Fig. 2.12 shows the CDCC interface circuit.

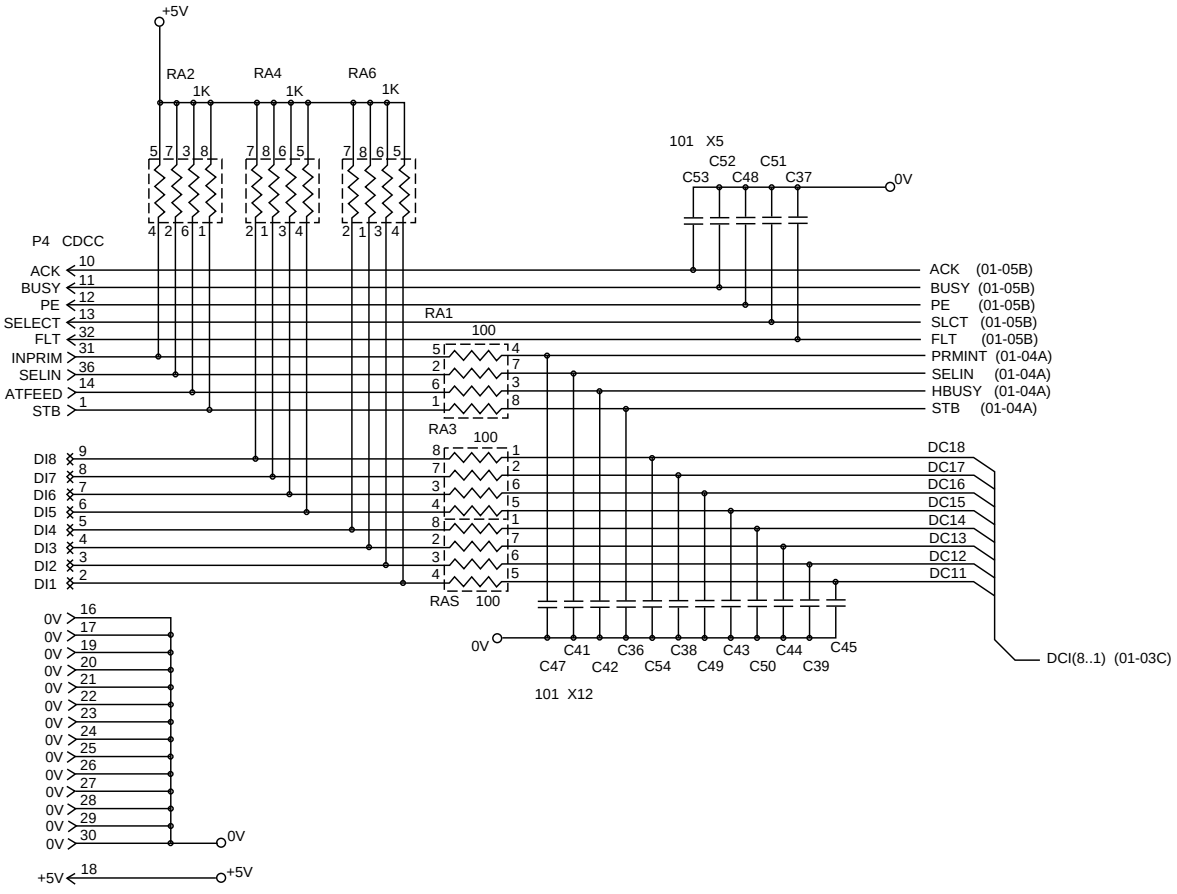


Fig. 2.12

1.3.10 Engine I/O

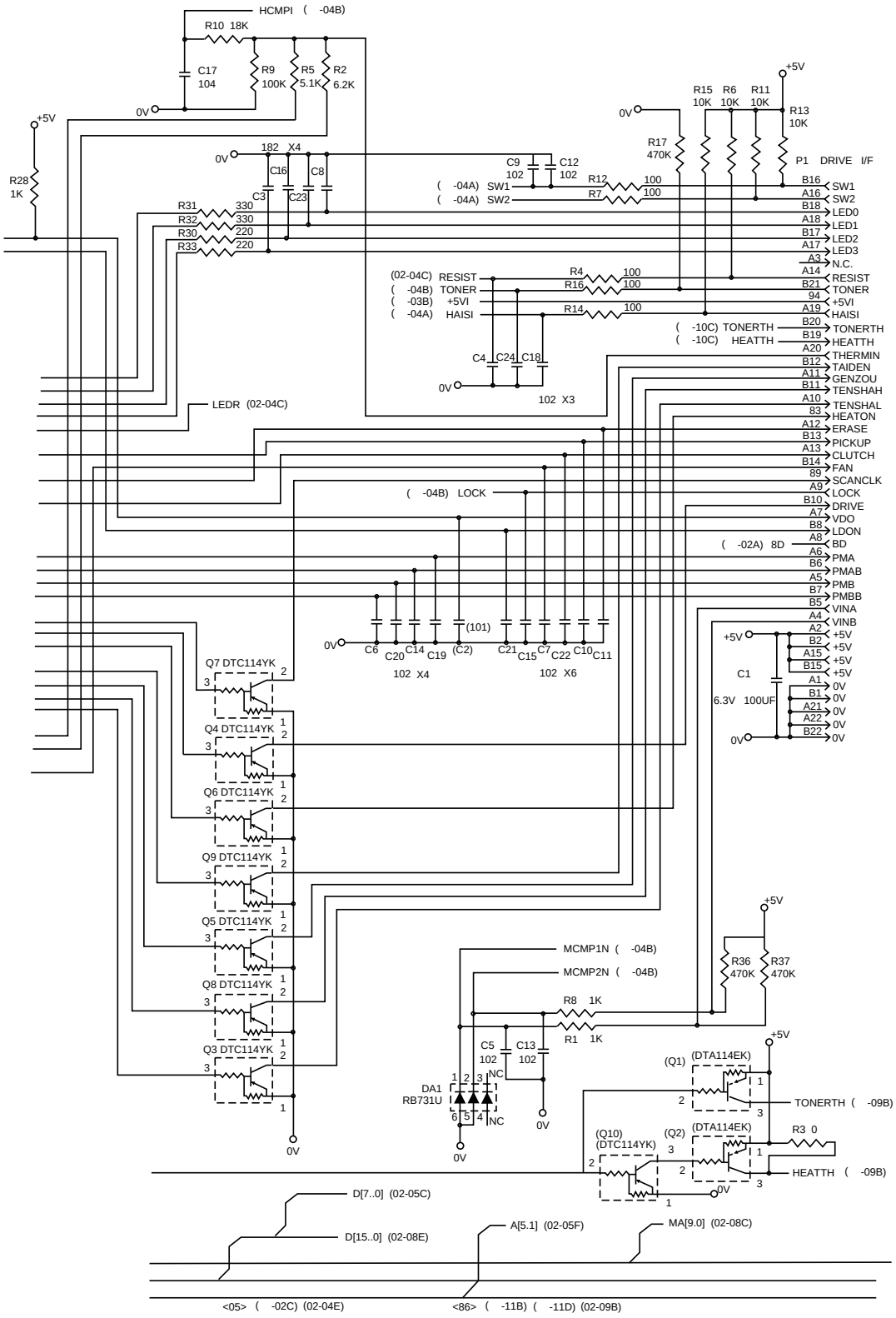


Fig. 2.13

1.4 Driver PCB

1.4.1 Paper Feed Motor Drive Circuit

The motor driver is a four-device FET array, which manage the constant current control by feeding back the voltage of the current detection resistor. The comparator for the constant current control is incorporated in the AS IC on the main PCB, which controls the excited output to go OFF by the specified period (12.5µs) when the motor drive current exceeds the specified current level. The excitation method is 2-2 phase excitation with an unipolar drive.

The four diodes D1NL2OU and Zener diode are the circuit that protects against overvoltage due to counter-electromotive force.

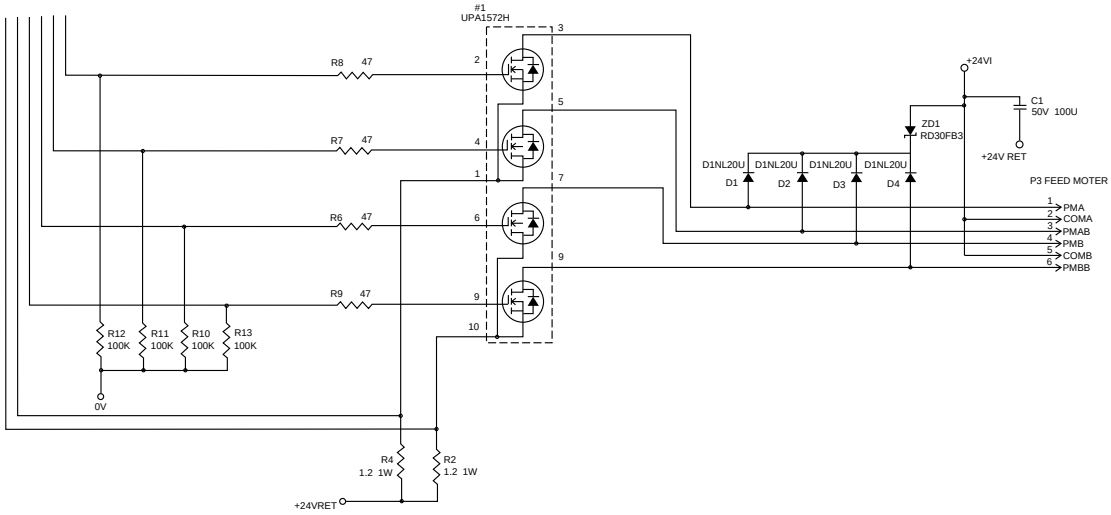


Fig. 2.14

1.4.2 Solenoid (Pick-up, Clutch), Erase Lamp, Fan Motor Drive Circuit

A darlington transistor (2SC5060) is used for these circuit.

A flywheel diode D1NL20U is provided for the fan motor drive circuit to prevent counter-electromotive force.

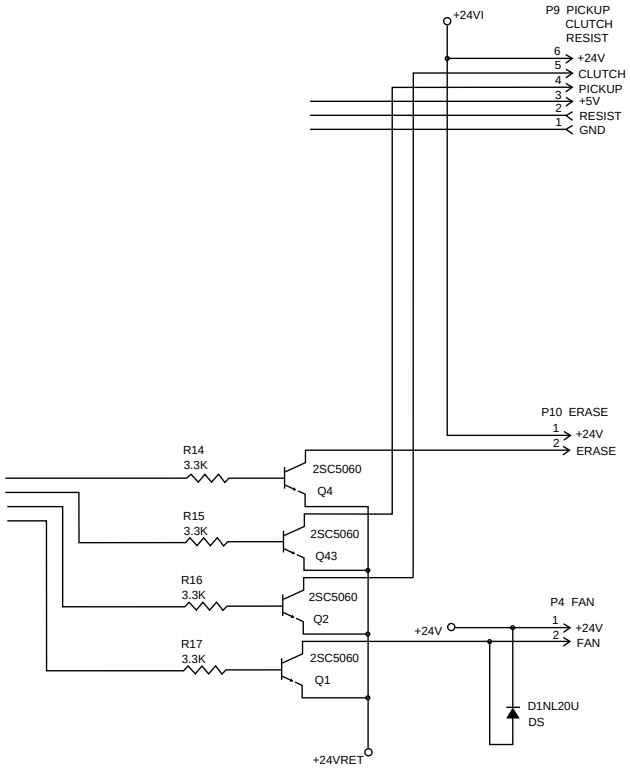


Fig. 2.15

1.4.3 Operation Panel

Four LEDS and two switches are mounted on the PCB.

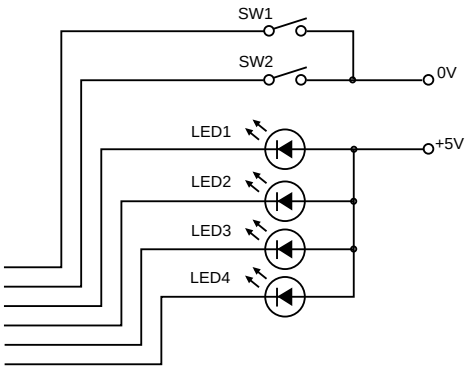


Fig. 2.16

1.4.4 Scanner Motor, Laser, Sensors (Registration, Paper Eject, Toner), Thermistor, High-voltage Power Supply.

Since these are controlled directly from the main PCB, the driver PCB has only relays the above signals of each connectors.

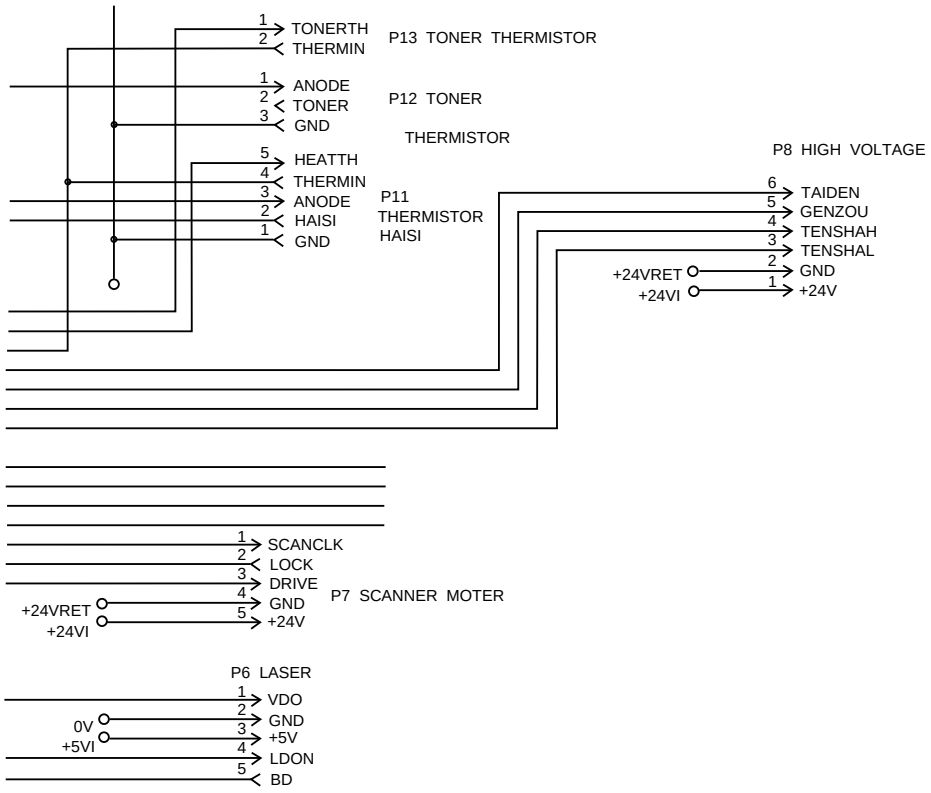


Fig. 2.17

1.5 Power Supply

The power supply uses the switching regulation system to generate the regulated DC power (+5V and +24V), which are converted from the AC line.

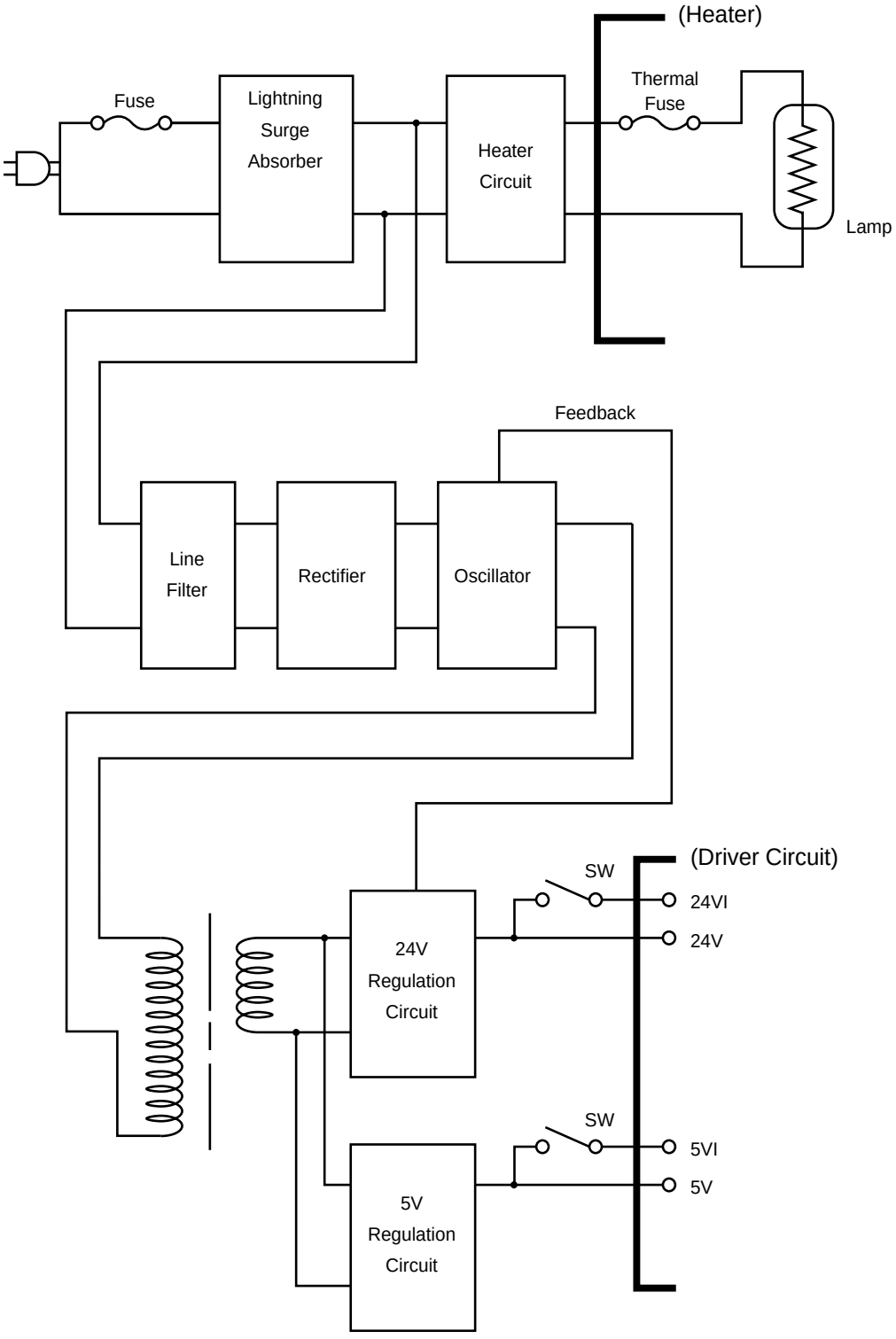


Fig. 2.18

2 MECHANICS

2.1 Overview of printing mechanism

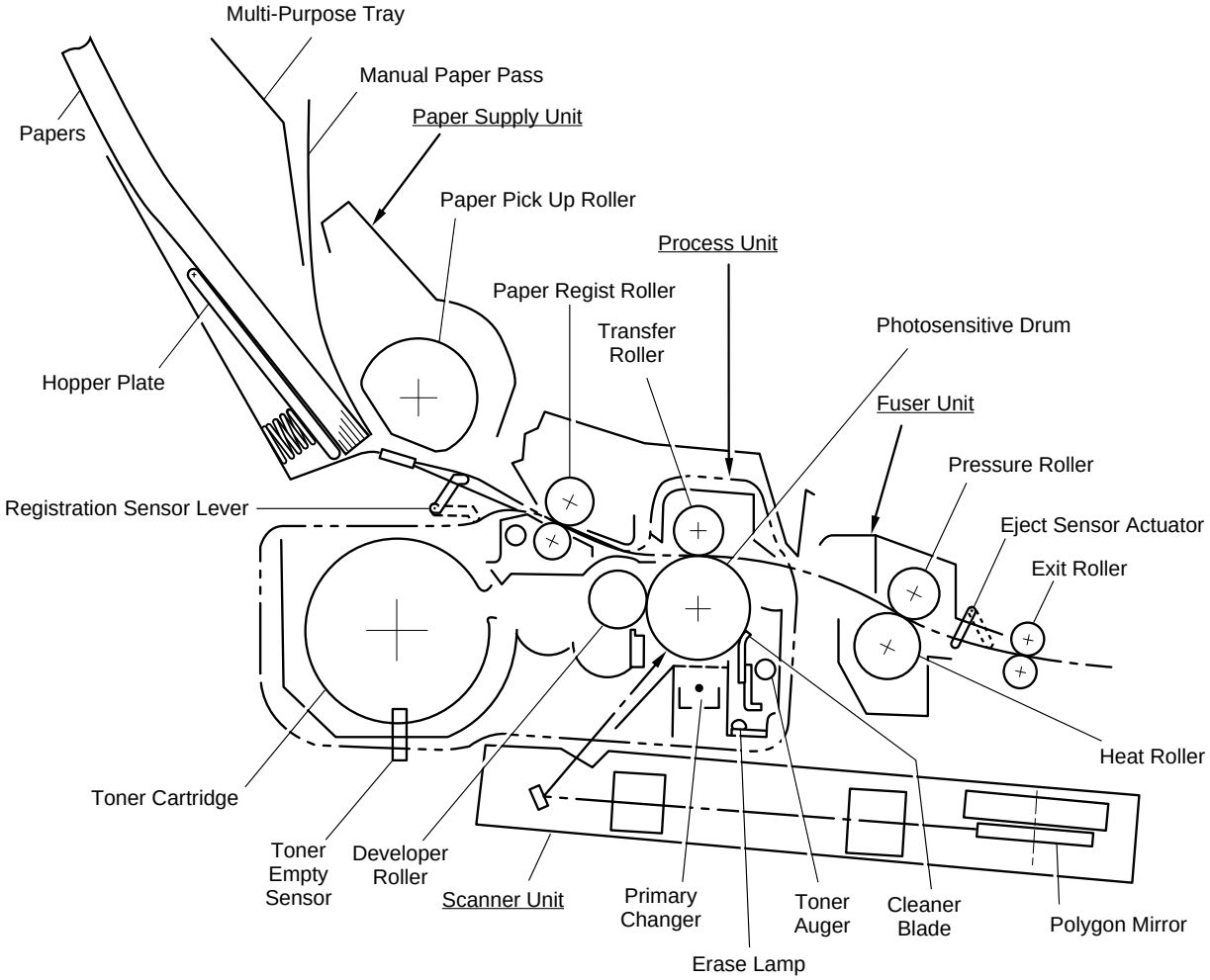
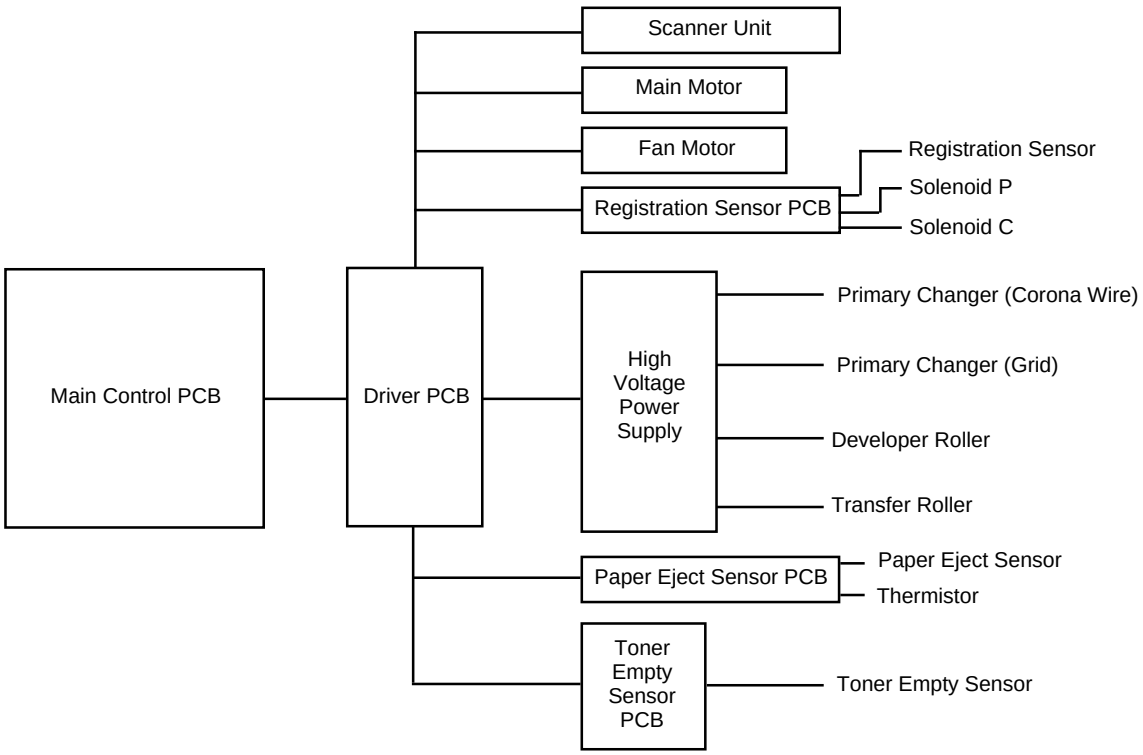


Fig. 2.19



2.2 Paper Transfer

2.2.1 Paper Supply

The pickup roller picks up one sheet of paper from the paper tray at every one rotation and feeds it to the registration roller one by one.

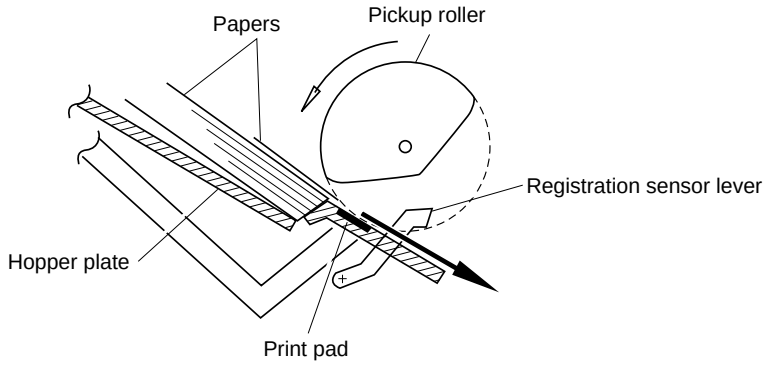


Fig. 2.20

The paper is gripped between the pickup roller and the separation pad and separated into individual sheets.

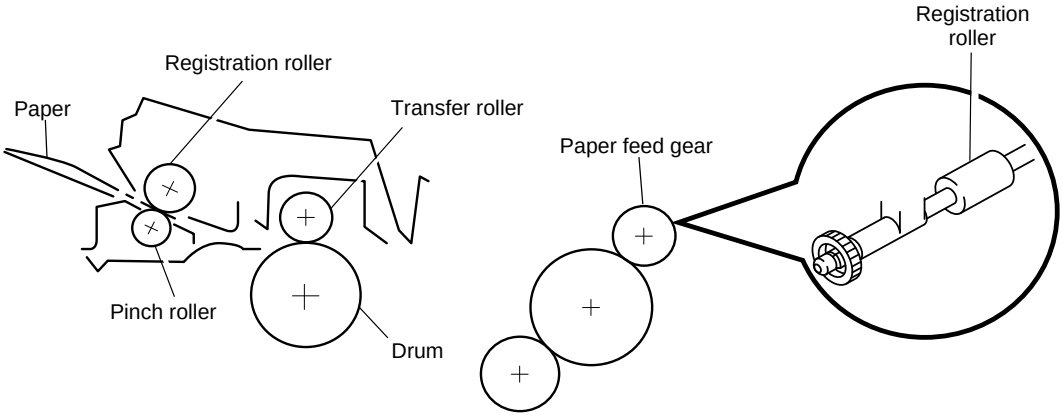
The pickup roller is directly connected to the sector gear, whose rotation is forcibly stopped by the gear stopper; when the pickup solenoid (solenoid C assembly) is activated, the gear stopper is released and the sector gear is driven; when it has completed one full turn its rotation is stopped again by the gear stopper.

The paper drawn out by the pickup roller presses against the top of form sensor lever and the paper top position/absence of paper is detected by sensing the motion of the lever.

2.2.2 Paper Registration

When paper picked up from the multi-paper tray (MPT) presses against the top of form sensor actuator, the registration sensor lever is caused to turn, and the photo sensor detects this motion.
With this signal from the sensor the registration roller is stopped of its rotation temporarily by the clutch. Then paper is fed to the nip point between the registration roller and the pinch roller in the process unit, and the skew of the paper is corrected by the bump of the leading edge of paper against the nip point.

When the registration roller starts to rotated again by the motion of clutch, paper, leading edge of which has been aligned, is fed by the registration roller and is transported to the transfer roller.



Clutch mechanism (engaged/released by the solenoid assembly)

Released when the solenoid is ON and engaged when the solenoid is OFF.

Fig. 2.21

2.2.3 Paper Eject

The completion of paper eject is detected in the following manner:

(a) when the leading edge of the paper push up the eject sensor actuator located in the fixing unit, the photo sensor (photo interrupter) is opened and detects the start of paper eject motion.

(b) After that, when the bottom of the edge of paper has passed through the paper eject sensor actuator, the photo sensor is closed and the completion of paper eject motion is recognized.

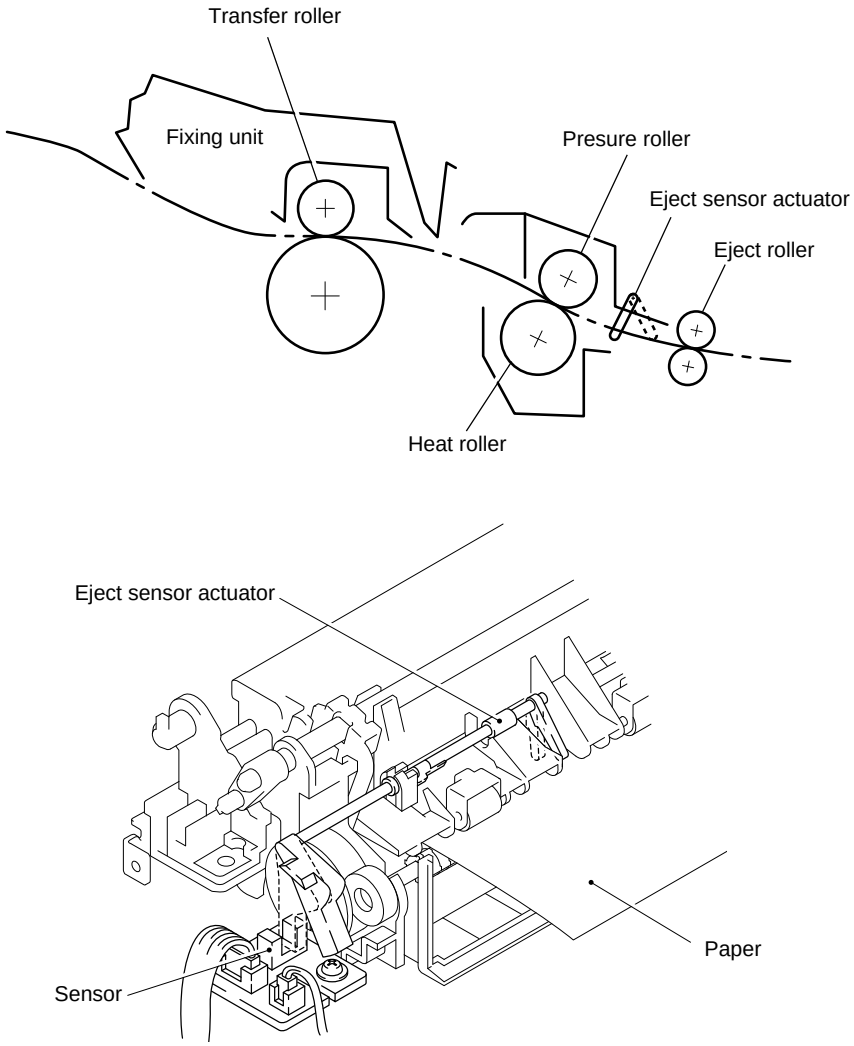


Fig. 2.22

2.3 Sensors

2.3.1 Multi-Paper Tray (MPT) Sensor

Detects whether or not the multi-paper tray is installed.

2.3.2 Cover Sensor

Detects open or close of the top cover.

2.3.3 Toner Empty Sensor

Detects if there is toner in the toner cartridge. It also detects whether or not the process unit is installed. (The toner cartridge is installed in the process unit).

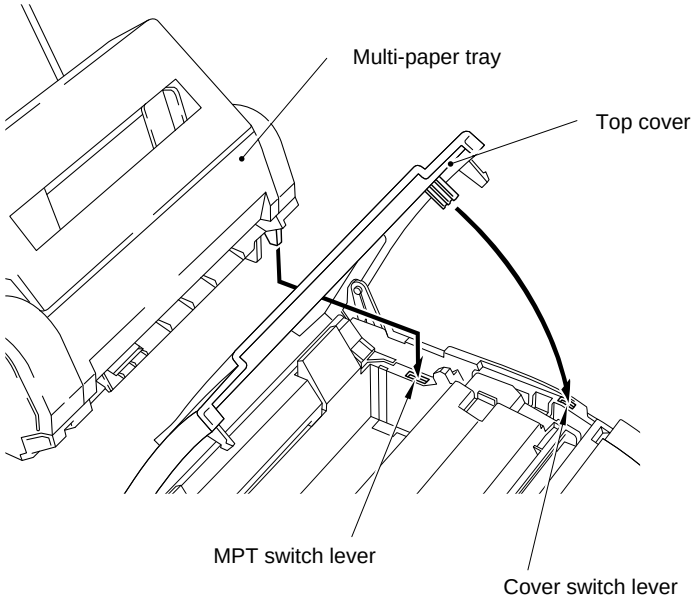


Fig. 2.23

2.4 Process Unit

2.4.1 Photosensitive Drum

Generates the latent electrostatic image and develops the image on the drum surface.

2.4.2 Primary Charger

Forms a uniform charge on the drum surface.

(1) Corona wire
Generates ion on the drum.

(2) Grid
Spreads the ion evenly over the drum.

2.4.3 Developer Roller

Develops the latent electrostatic image on the drum surface by the toner.

2.4.4 Transfer Roller

Transfers the toner image to the paper from the drum surface.

2.4.5 Cleaner Blade

Remove the toner remaining on the drum surface.

2.4.6 Toner Auger

Transport the waste toner from the cleaner to the developer unit.

2.4.7 Erase lamp

Discharges the electrostatic latent image on the drum.

2.5 Print Process

2.5.1 Charging

The drum is charged to appox +700V by ion which is generated by the primary charger. Ion is generated by an ionization of the corona wire, which applied DC bias from High Voltage Power Supply. The flow of ion is controlled by the grid to be distributed evenly on the drum surface. The other end of the grid is grounded to the frame through the varistor.

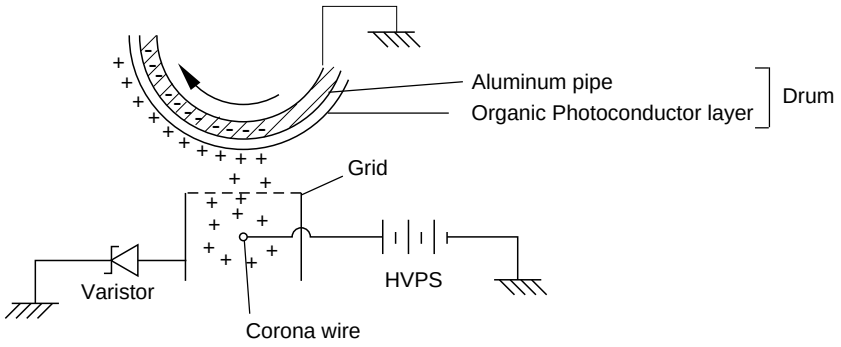


Fig. 2.24

The primary charge uses a corona wire, but since the charging terminal of the drum is a positive terminal , only less than 1/10 of the usual quantity of ozone is generated. The level of ozone expelled from the printer is therefore not harmful to the human body. Applicable safety standards have been complied with.

2.5.2 Exposure stage

After the drum is positively charged, it is exposed to the light emitted from the laser unit.

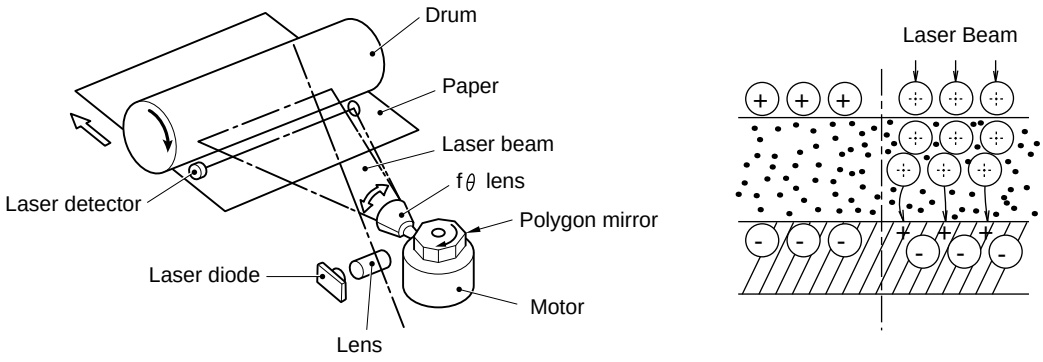


Fig. 2.25

The exposed area is the part to be printed. The surface potential of the exposed area is decreated forming an electrostatic image to be printed.

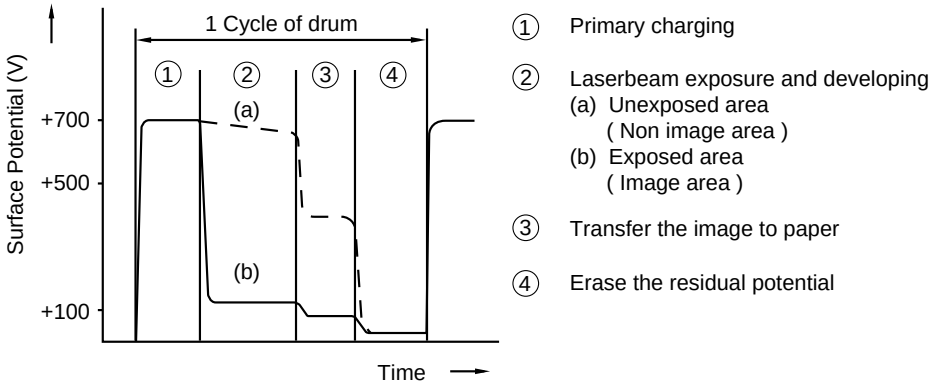


Fig. 2.26

2.5.3 Developing

Developing causes the toner to be attracted to the electrostatic image on the drum so as to transform it into a visible image.

The Developer Consists of the magnetic carrier and the magnetic toner. The developer makes the magnetic brush on the developer roller which includes the rotatable magnet roller. The magnetic brush softly rubs the drum, and then only the toner developed on the latent electrostatic image.

The carrier particles are attracted to the developer roller.

The toner receives a positive static charge as the toner particles rub against the carrier particle, rotating developer roller, and trimmer blade. Electrostatic field between the drum and the developer roller, which is DC-biased from the High voltage power supply, makes electrostatic potential to attract toner particles from the developer roller to the drum.

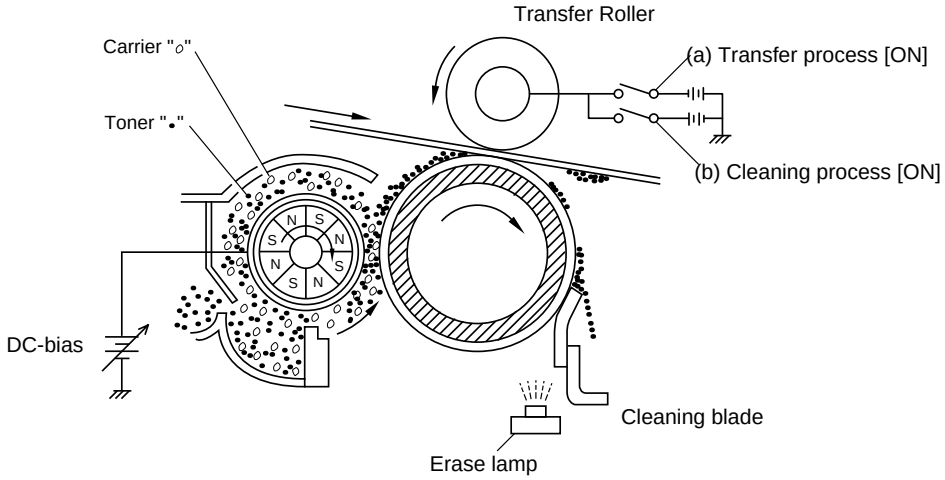


Fig. 2.27

2.5.4 Transfer

(a) Transfer process

After the drum has been charged and exposed, and has received a developed image, the toner formed image is transferred onto the paper , applying the negative charge from the backside of the paper. The negative charge to the paper causes the positive charged toner to leave the drum, and adhere to the paper. As a result, the image is visible on the paper.

(b) Cleaning process of transfer roller

If the toner is not transferred onto the paper perfectly due to jamming etc., it is possible that the toner adheres to the charge transfer roller. The transfer voltage charges to positive voltage during non transferring process.

Therefore the transfer roller is cleaned by returning the positive charged toner adhered on the transfer roller onto the photo-conductive drum.

2.5.5 Drum Cleaning Stage

In the image transfer stage, not all the toner on the photosensitive drum is transferred onto the paper but some of them remain on the drum. In the drum cleaning stage, the drum surface is cleaned by the cleaning blade, so that residual toner on the drum surface is removed away and collected in the cleaning housing. In the cleaning housing, collected toner is transported to the developer unit by the toner auger. This toner is mixed with new toner and is used again at the developing stage.

2.5.6 Erasing Stage

After the cleaning stage, the drum surface is exposed by the light emitted from the erase lamp. (LED lamp) This stage prepares the drum to decrease its surface voltage uniformly, and to receive an uniform change in the primary charging stage.

CHAPTER III DISASSEMBLY AND REASSEMBLY

1 SAFETY PRECAUTIONS

To prevent the creation of secondary problems by mishandling, be careful about the following precautions during maintenance work.

(1) Always turn off the power before replacing parts or units. When accessing the power supply PCB or components, be sure to unplug the power cord from the power outlet.

(2) Be careful not to lose screws, washers, or other parts removed.

(3) Be sure to apply grease to the gears and applicable popsitions specified in this chapter.

(4) When using soldering irons or other heat-generating tools, take care not to damage the resin parts such as wires, PCBs, and covers.

(5) Before handing the PCBs, touch a metal portion of the equipment to discharge the static electricity charged in your body, or the electronic parts or components may be damaged.

(6) When transporting PCBs, be sure to wrap them in conductive sheet such as aluminum foil.

(7) Be sure to replace self-tapping screws correctly, if removed.
Unless otherwise specified, tighten screws to the following torque values.

TAPTITE, BIND or CUP B

M3 : 6kgf • cm

M4 : 9kgf • cm

TAPTITE, BIND S

M3 : 9kgf • cm

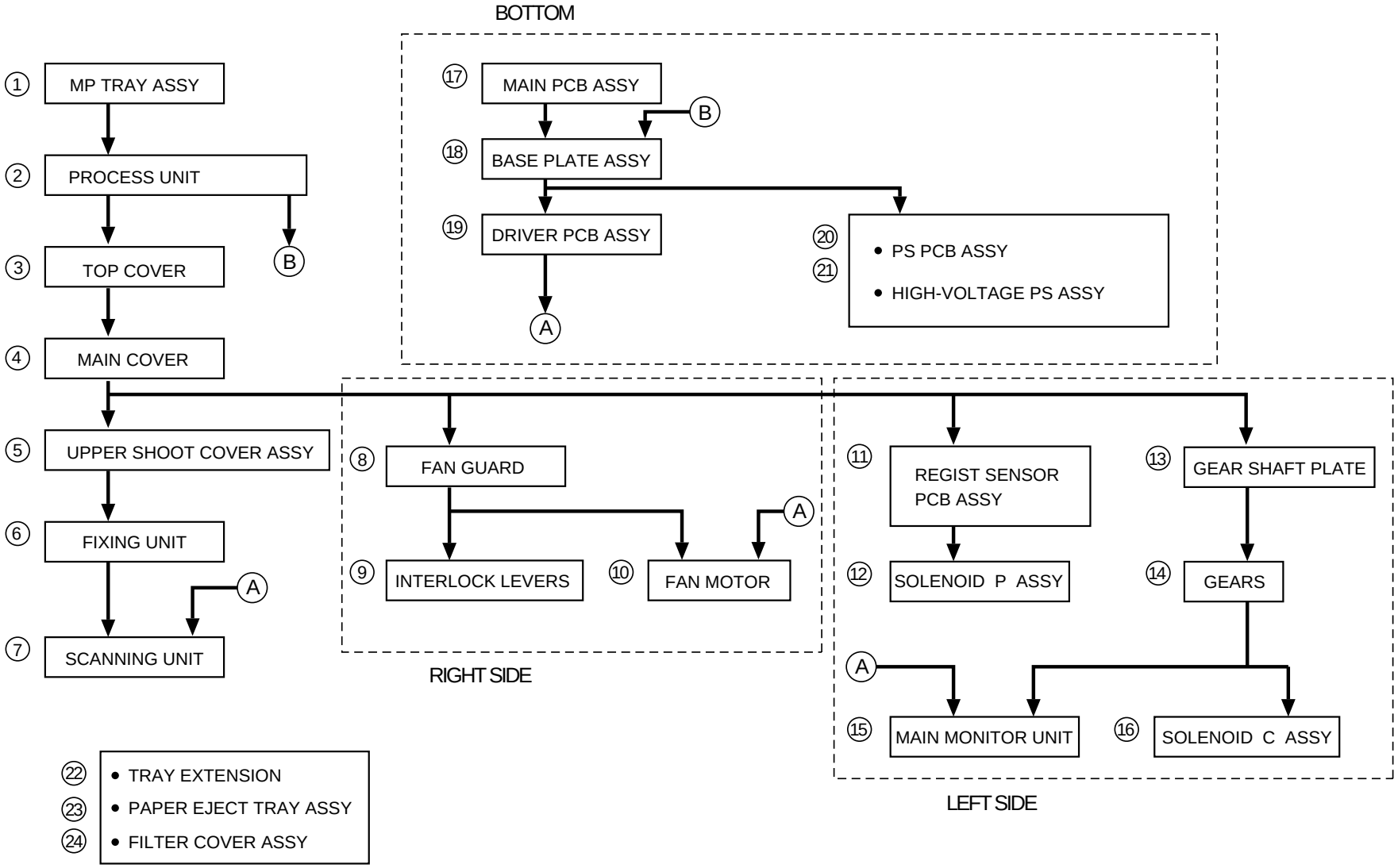
SCREW

M3 : 7kgf • cm

M4 : 10kgf • cm

(8) When connecting or disconnecting cable connectors, hold the connector bodies, but not the cables. If the connector has a lock, release the connector lock first to unlock it.

(9) After a repair, check not only the repaired poprtion but also the connectors, or check if other related portions are functioning properly before doing operation checks.


BOTTOM
1 MP TRAY ASSY
2 PROCESS UNIT
3 TOP COVER
4 MAIN COVER
5 UPPER SHOOT COVER ASSY
6 FIXING UNIT
7 SCANNING UNIT
A
B
17 MAIN PCB ASSY
18 BASE PLATE ASSY
19 DRIVER PCB ASSY
20
21
• PS PCB ASSY
• HIGH-VOLTAGE PS ASSY
8 FAN GUARD
9 INTERLOCK LEVERS
10 FAN MOTOR
RIGHT SIDE
11 REGIST SENSOR PCB ASSY
12 SOLENOID P ASSY
13 GEAR SHAFT PLATE
14 GEARS
15 MAIN MONITOR UNIT
16 SOLENOID C ASSY
LEFT SIDE
22 • TRAY EXTENSION
23 • PAPER EJECT TRAY ASSY
24 • FILTER COVER ASSY

3 DISASSEMBLING PROCEDURE

3.1 Multi-purpose Paper Tray

(1) Lift the multi-purpose paper tray upward to remove it.

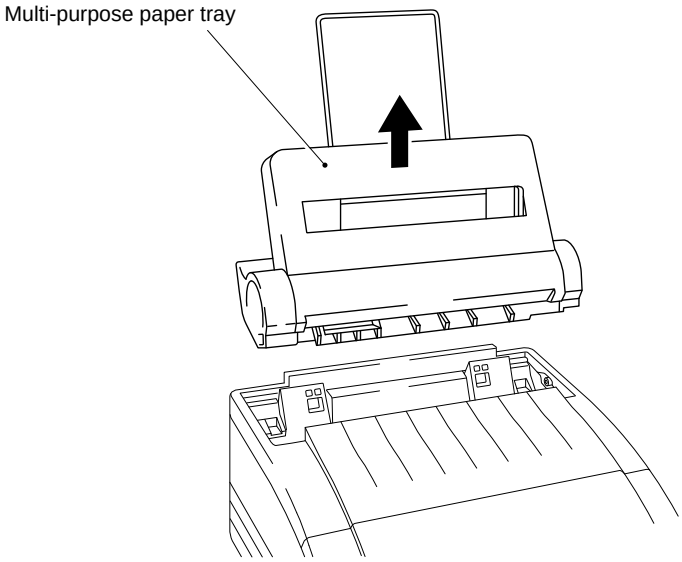


Fig. 3.1

3.2 Process unit

(1) Open the top cover.

(2) Release the locks of the upper shoot cover and open it out toward the front of the printer.

(3) Lift out the process unit.

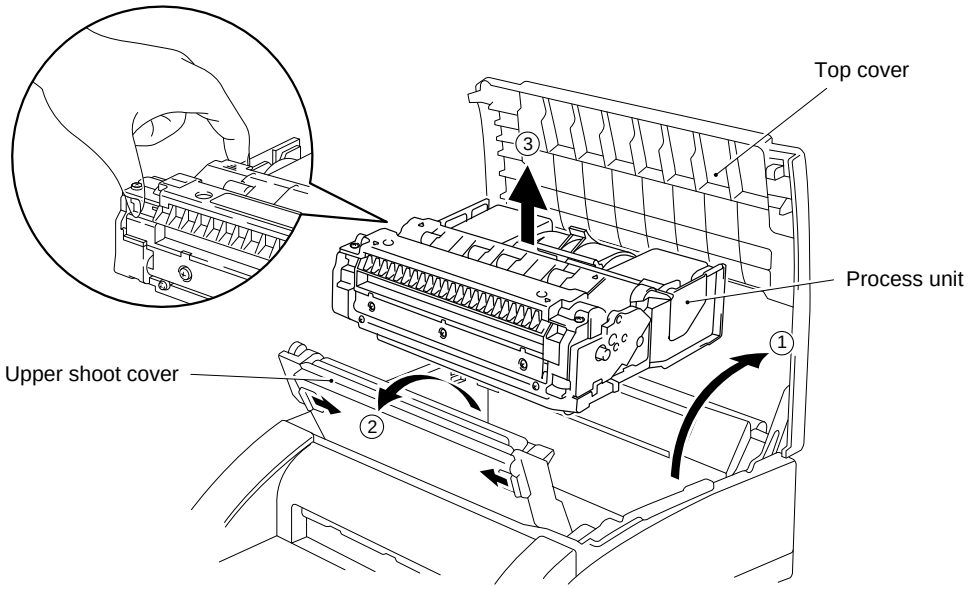


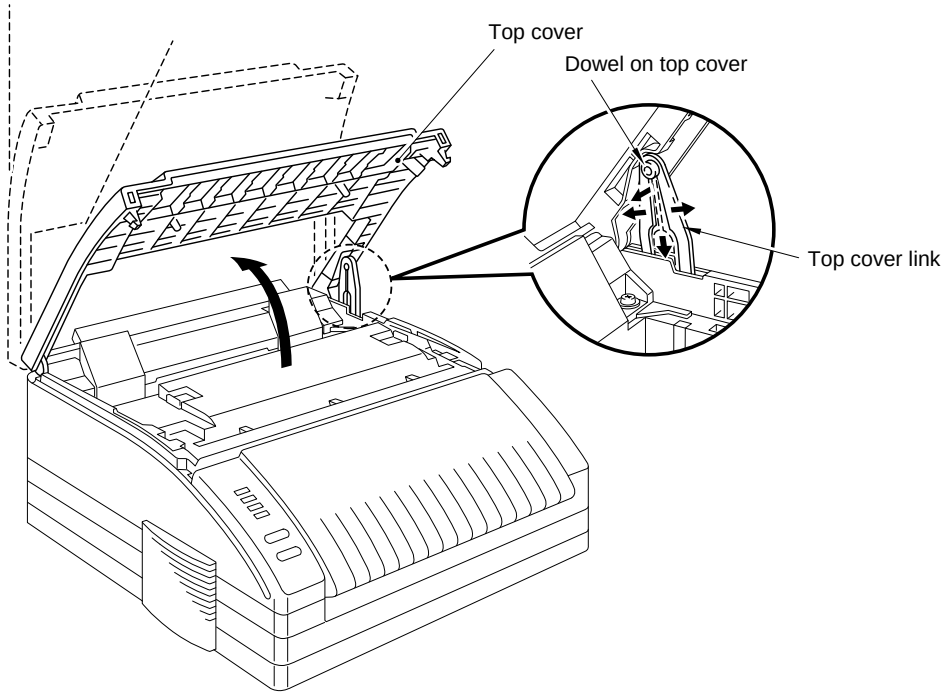
Fig. 3.2

3.3 Top Cover

(1) Open the top cover to the first lock position.

(2) Prize up the top cover link and free it from the dowel on the top cover to release it inward.

(3) Press the link downward.



(4) Open the top cover further, release the catch of the right side by lifting the top cover upward and then slide the top cover leftward.

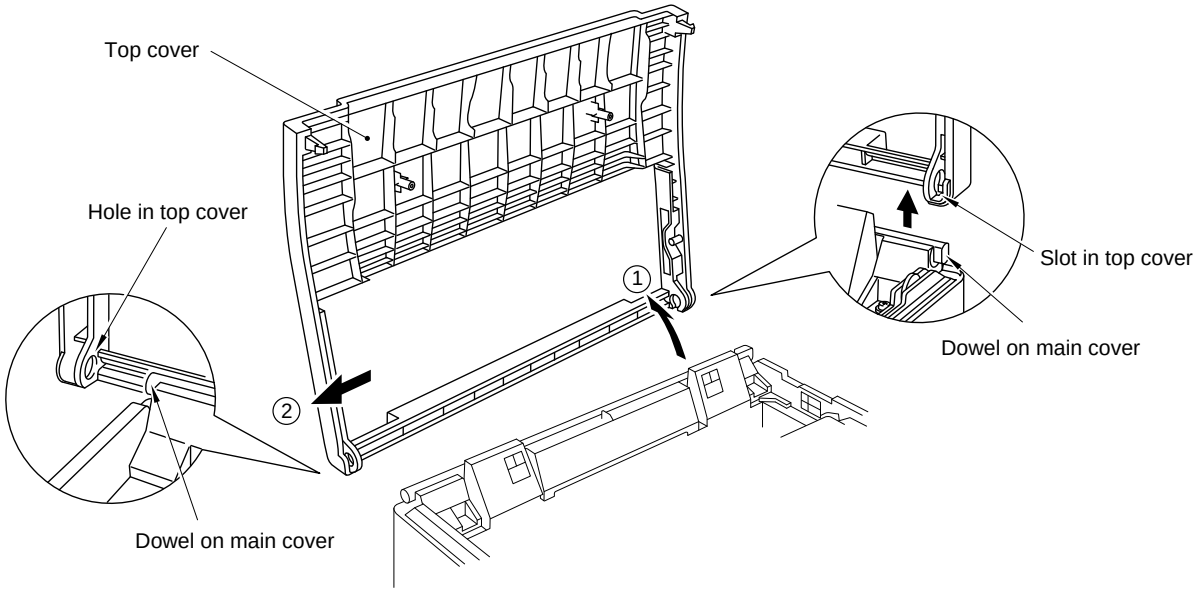


Fig. 3.3

3.4 Main Cover

(1) Remove the four screws securing the main cover.

(2) Release the catch on the bottom of the front face of the main cover and lift the main cover upward.

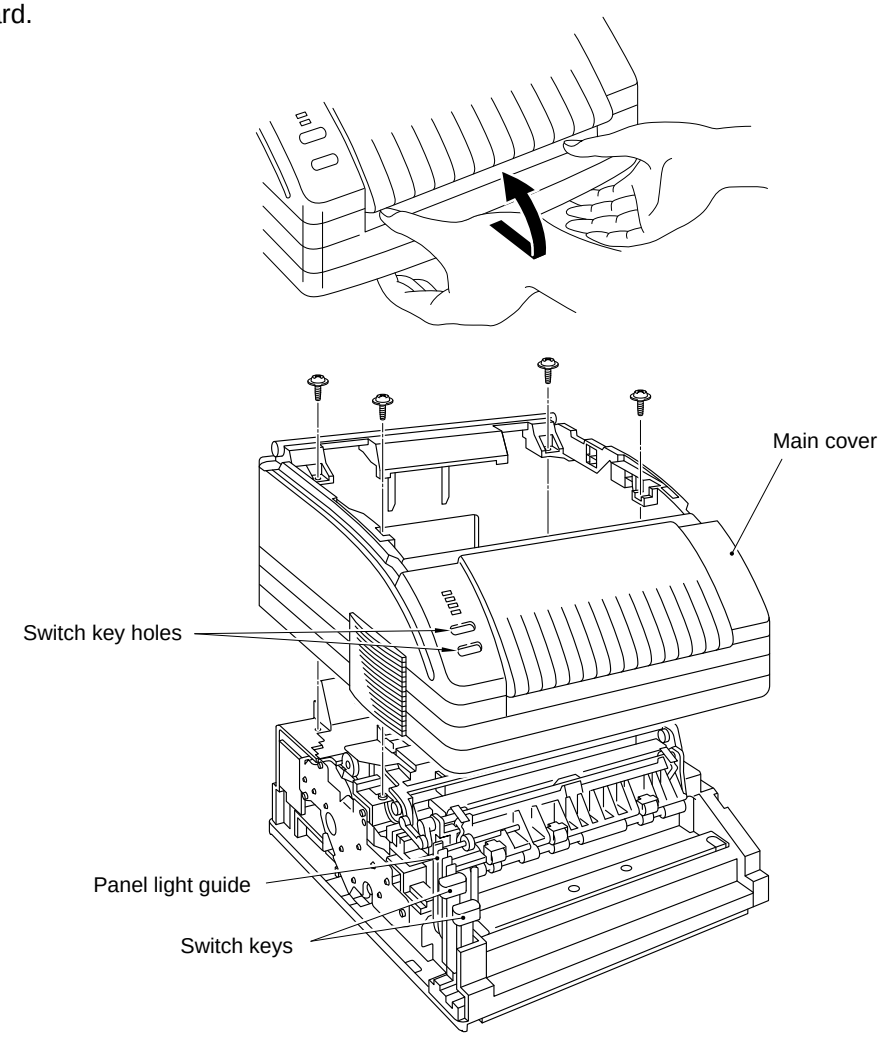


Fig. 3.4

NOTE: When fitting the main cover, the switch key and panel light guide (on this left side) must be carefully inserted into the corresponding holes in the main cover.

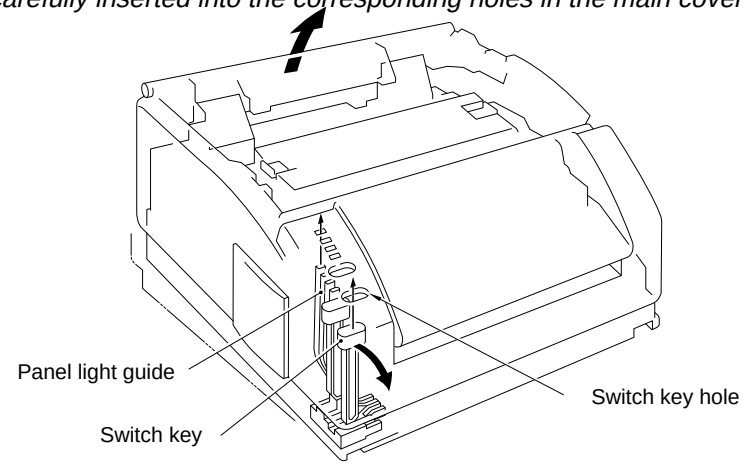


Fig. 3.5

3.5 Upper Shoot Cover

(1) Open the upper shoot cover

(2) Push down the release link and release it from the dowel on the fixing unit.

(3) Release the locks on the upper shoot cover, then remove the upper shoot cover from the frame by sliding it to the left.

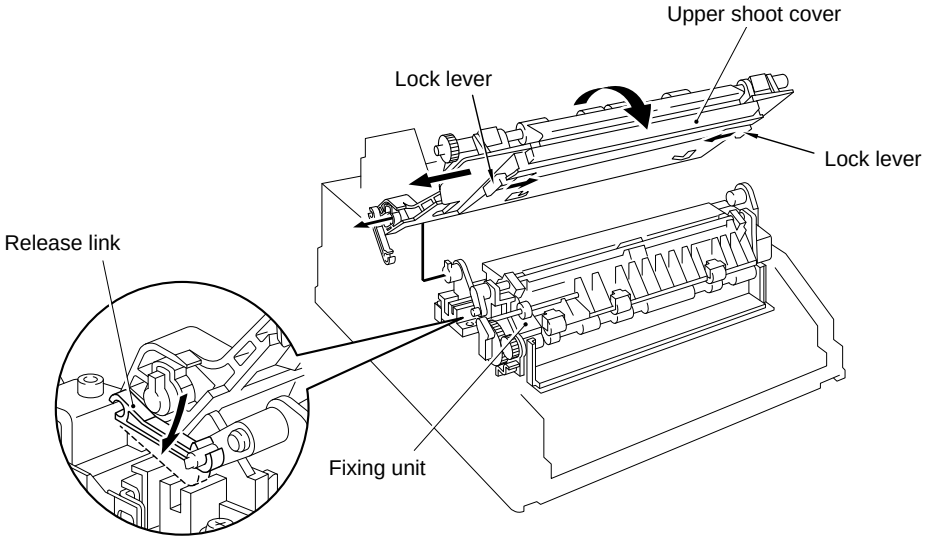


Fig. 3.6

3.6 Fixing Unit

(1) Disconnect the fixing unit connector on the left side.

(2) Remove the three screws securing the fixing unit.

(3) Lifting up the fixing unit, disconnect the two heater harnesses on the right side.

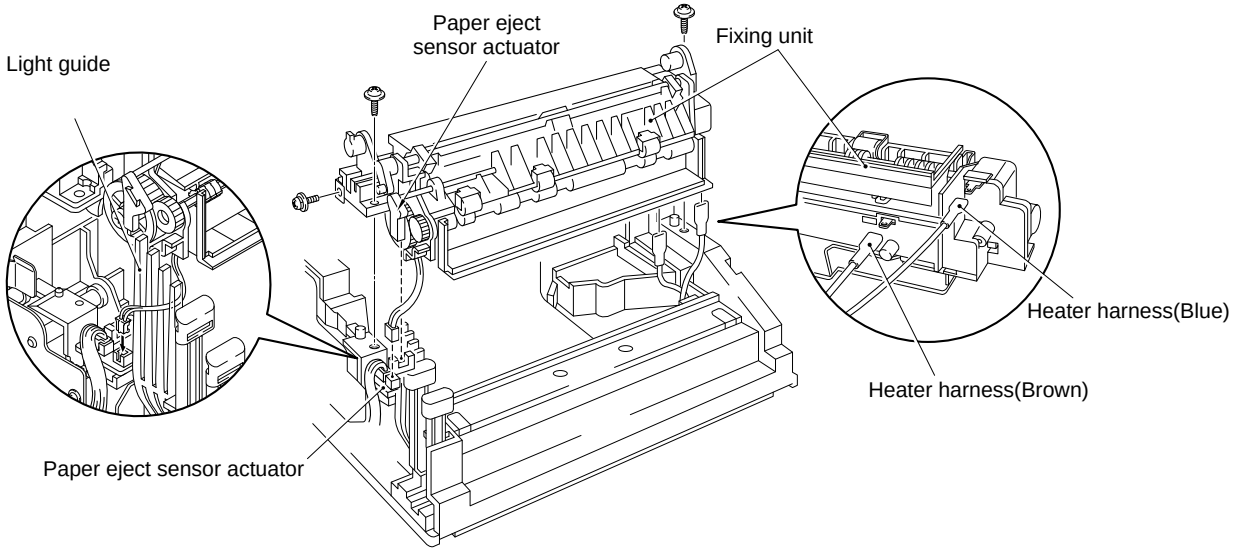


Fig. 3.7

NOTE: When attaching the fixing unit, be sure to connect the fixing unit connector and the two heater harnesses.
Be careful not to damage the paper eject sensor actuator.

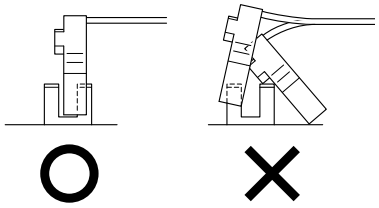


Fig. 3.8

3.7 Scanner Unit

(1) Disconnect the two connectors of the scanner unit from the driver PCB (Refer to 3.19).

(2) Remove the four screws.

(3) Lift out the scanner unit.

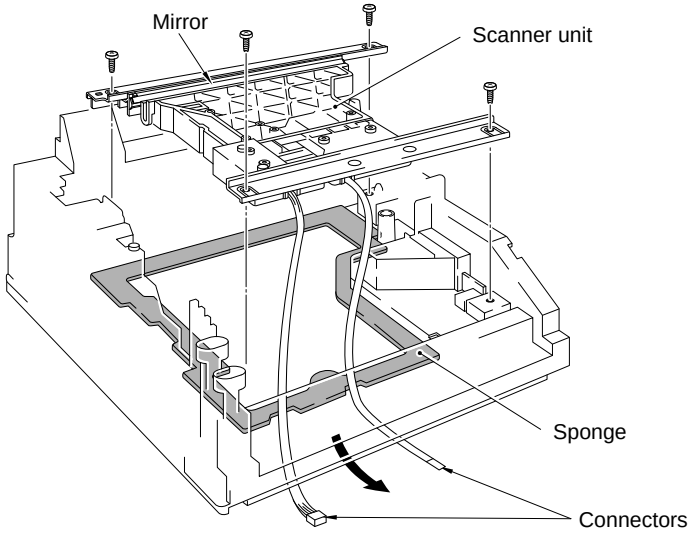


Fig. 3.9

NOTE: Never touch the inside of the scanner unit or the mirror when disassembling or reassembling. If there is any garbage or dust on the mirror, blow it off.

3.8 Fan Guard

(1) Remove the two screws securing the fan guard, and take it off.

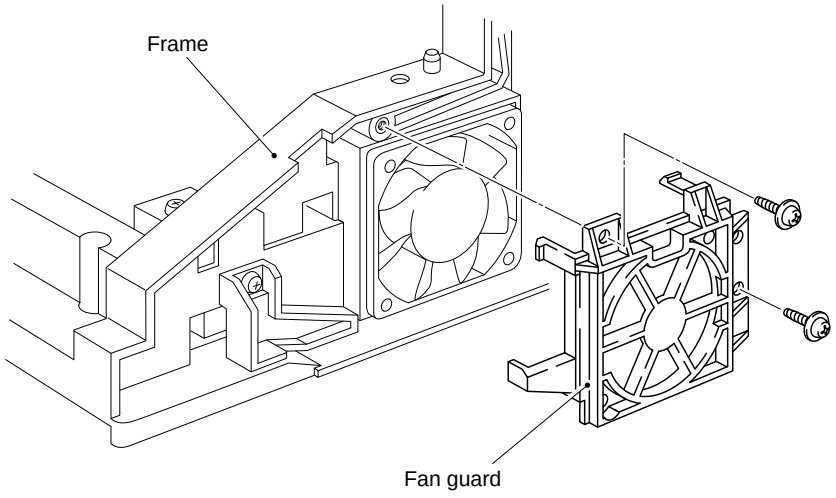
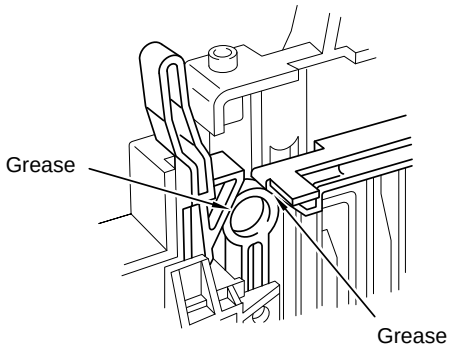


Fig. 3.10

3.9 Interlock Levers

(1) Grease the contacting portions of the interlock levers on assembly.



Grease: MolyKote EM30L

Fig. 3.11

3.10 Fan Motor

(1) Disconnect the connector from the driver PCB (Refer to 3.19).

(2) Take off the fan motor.

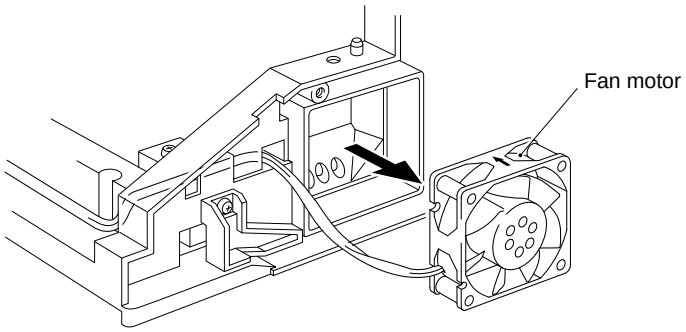


Fig. 3.12

3.11 Registration Sensor PCB

(1) Remove the screw of the registration sensor PCB.

(2) Disconnect three connectors from the Registration sensor PCB.

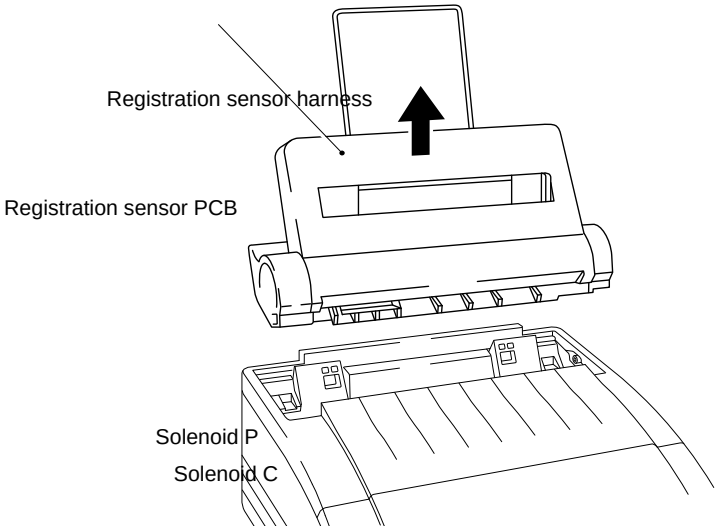


Fig. 3.13

3.12 Solenoid P

(1) Pull out the solenoid P from the frame by releasing the hook of the solenoid lever.

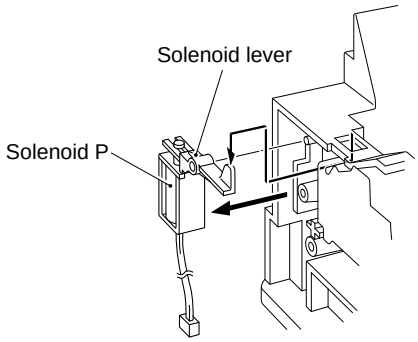
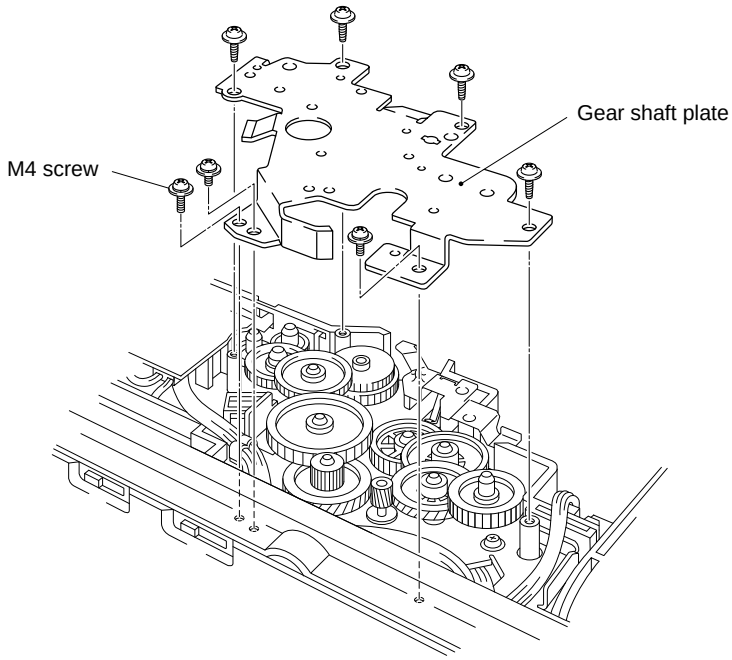


Fig. 3.14

3.13 Gear Shaft Plate

(1) Remove the seven screws securing the gear shaft plate.



NOTE: On re-assembly, run the registration sensor harness along the route shown in the figure below.

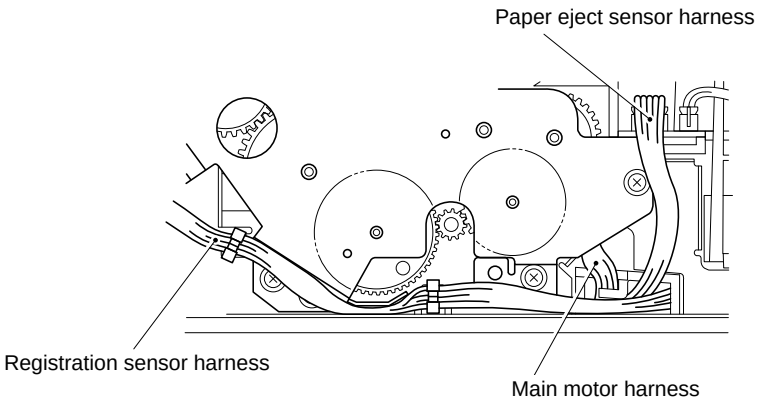
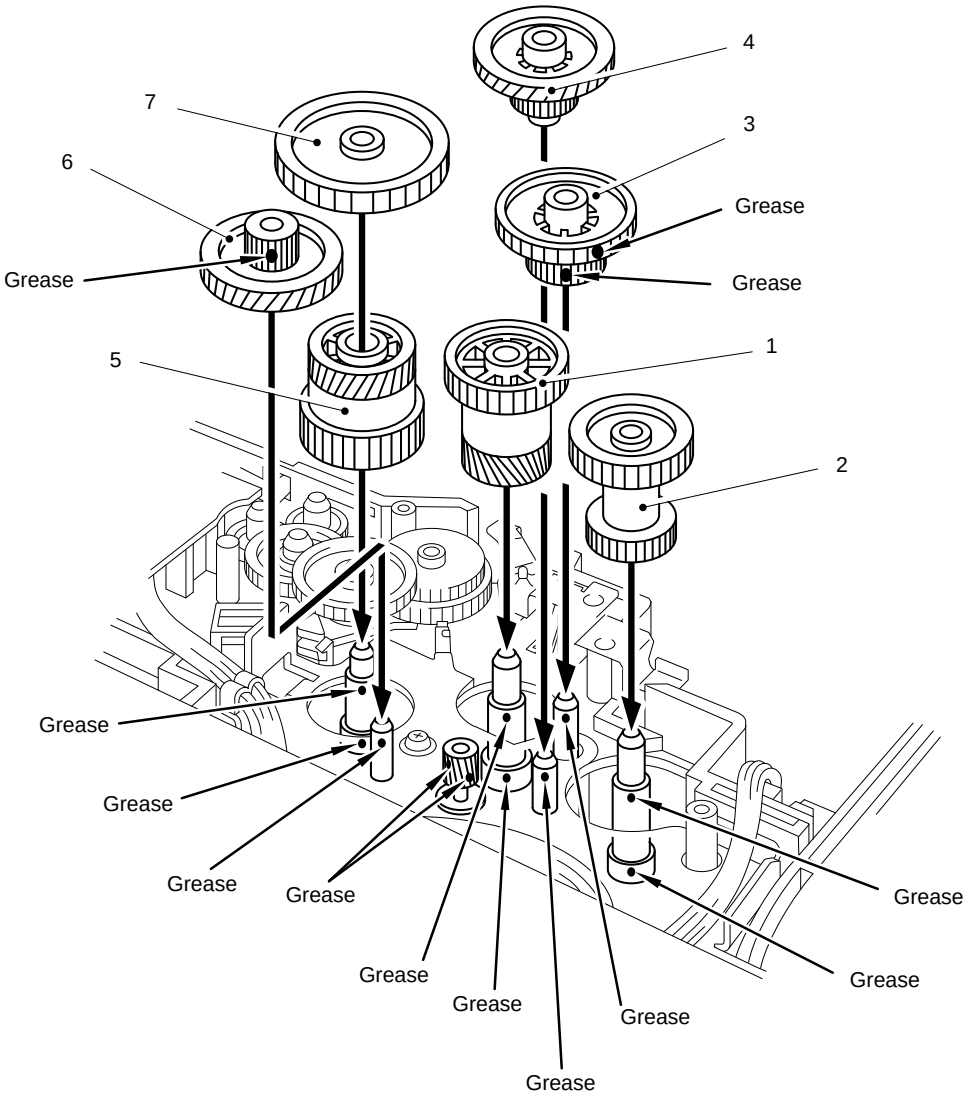


Fig. 3.15

3.14 Gears

(1) Grease the metal gear shafts and gear surfaces on the specified portion illustrated below when reassembling.



Grease: MolyKote EM30L

Fig. 3.16

3.15 Main Motor Unit

(1) Disconnect three connectors from the driver PCB (Refer to 3.19).

(2) Remove two screws securing the main motor unit.

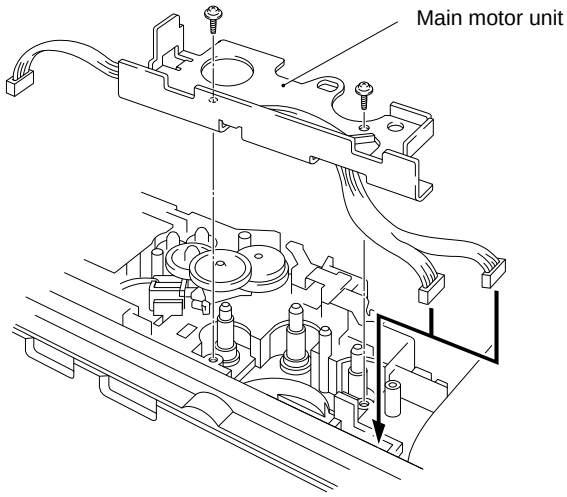
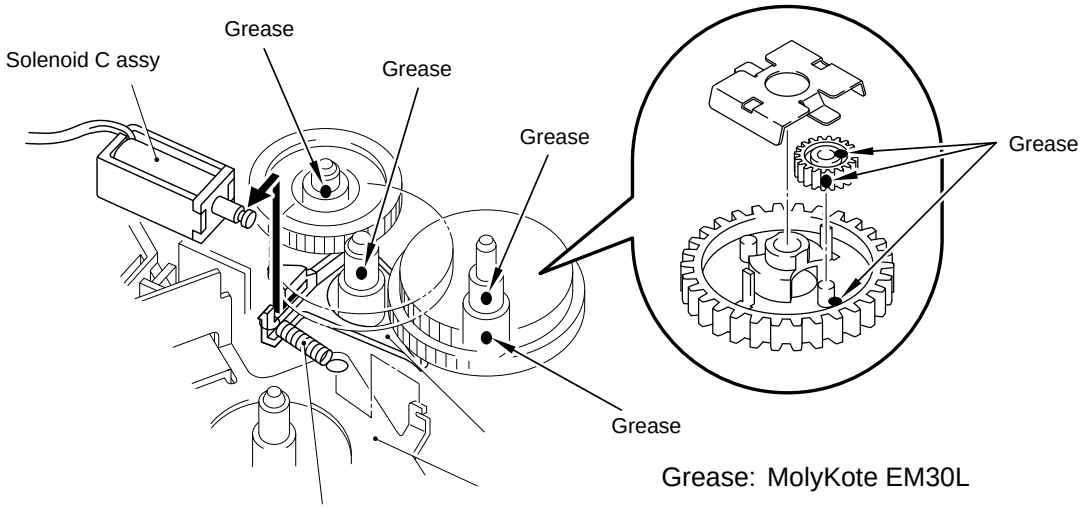


Fig. 3.17

3.16 Solenoid C

(1) Remove the spring of the solenoid C.

(2) Remove the solenoid C.



Grease: MolyKote EM30L

Fig. 3.18

NOTE: When re-assembling, grease up to the specified portions of each gear shown in the above figure.

3.17 Main PCB

(1) Remove three screws securing the main PCB holder on the back side of the printer.

(2) Grasp the hooks at left and right and draw out the main PCB assembly.

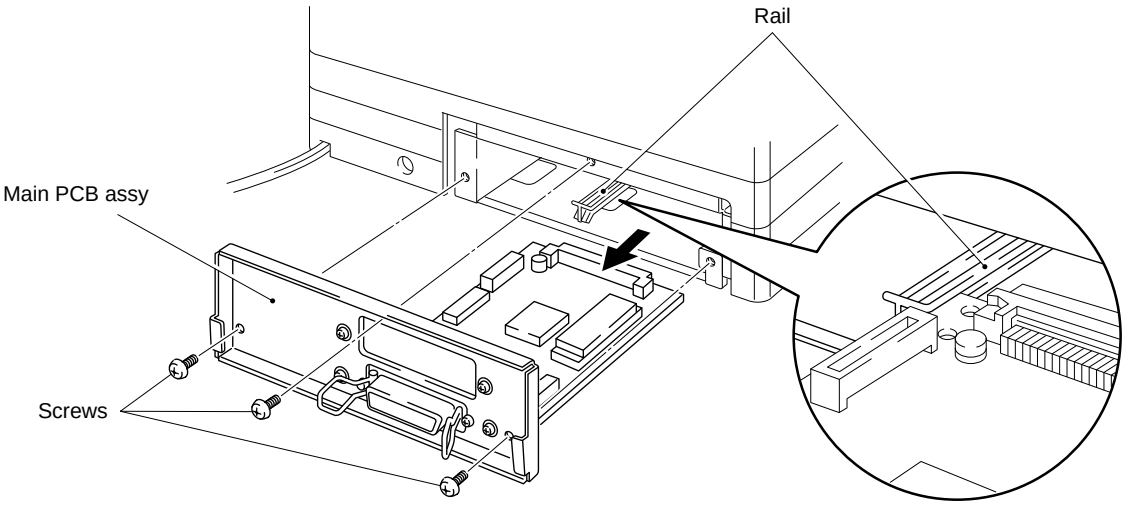


Fig. 3.19

3.18 Base Plate

NOTE: Prior to turning the printer upside-down, the multi-purpose tray assembly and process unit should be removed from the printer.

(1) Turn the printer upside down.

(2) Remove the eight self-tapping screw, one M3 screws and two M4 screws.

(3) Lift out the base plate and remove the grounding screw.

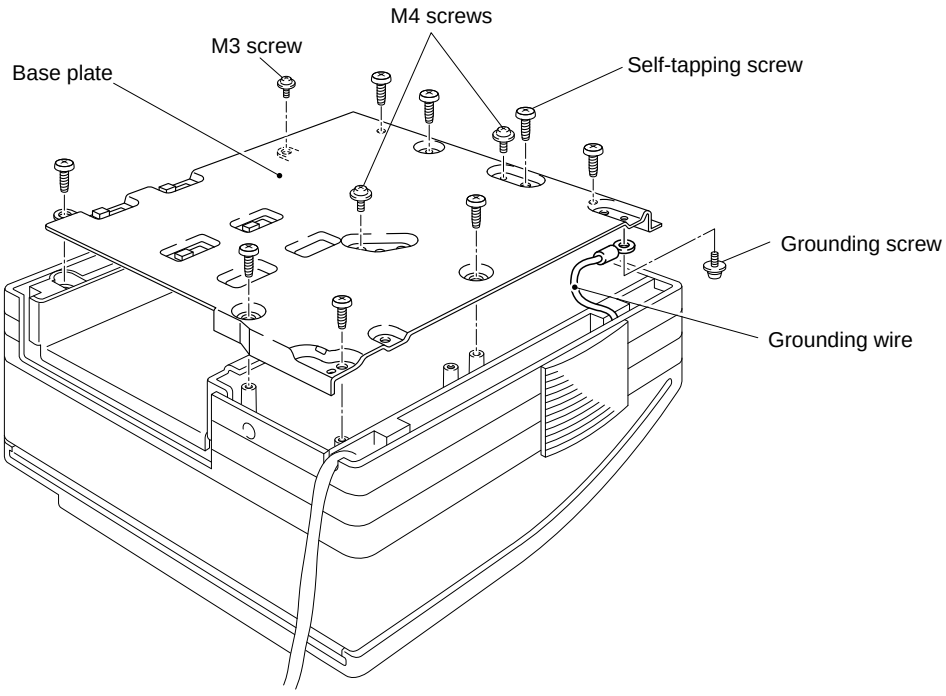


Fig. 3.20

NOTE: Install the grounding wire after fitting the base plate so that it does not contact the soldered side of the base plate.

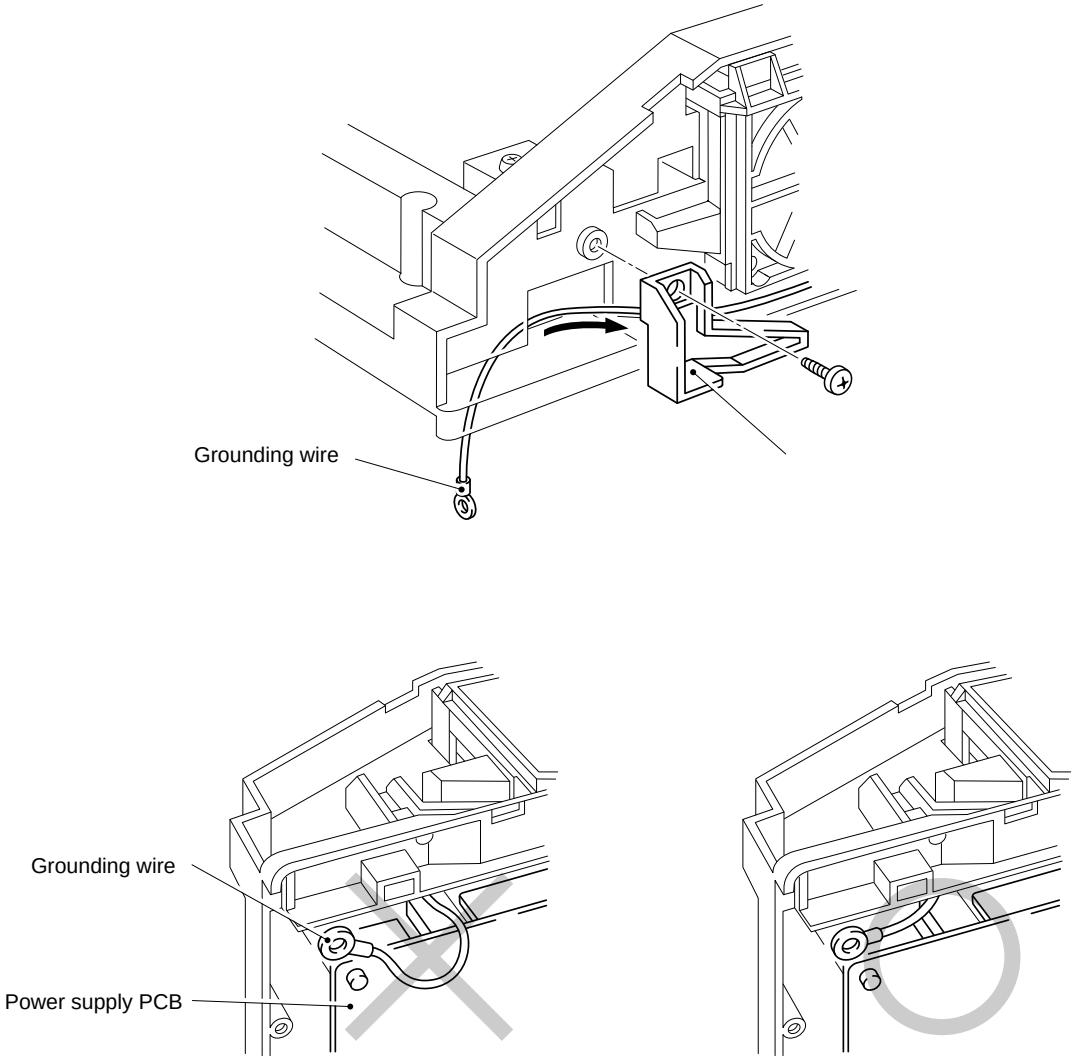


Fig. 3.21

3.19 Driver PCB

(1) Remove the two screws securing the driver PCB.

(2) Disconnect the ten connectors from the PCB.

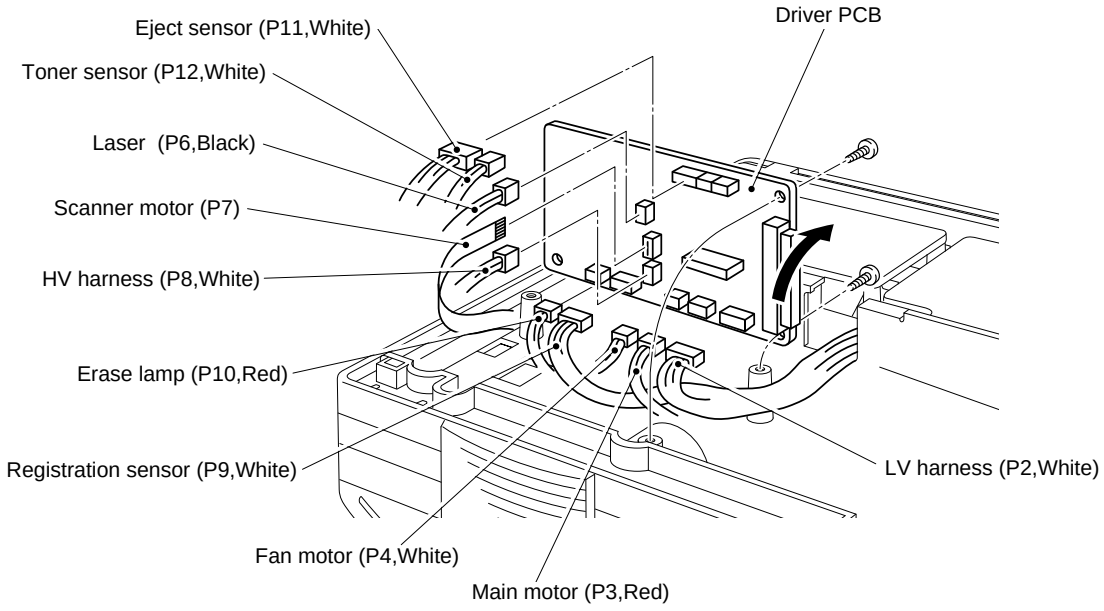


Fig. 3.22

NOTE1: When reassembling, the connectors must be inserted to the PCB without floating and the PCB must not be floated by the harnesses.

NOTE2: The connector should be inserted by fitting the housing color and the pin number.

3.20 Power Supply PCB

(1) Disconnect the three connectors from the component side of the PCB.

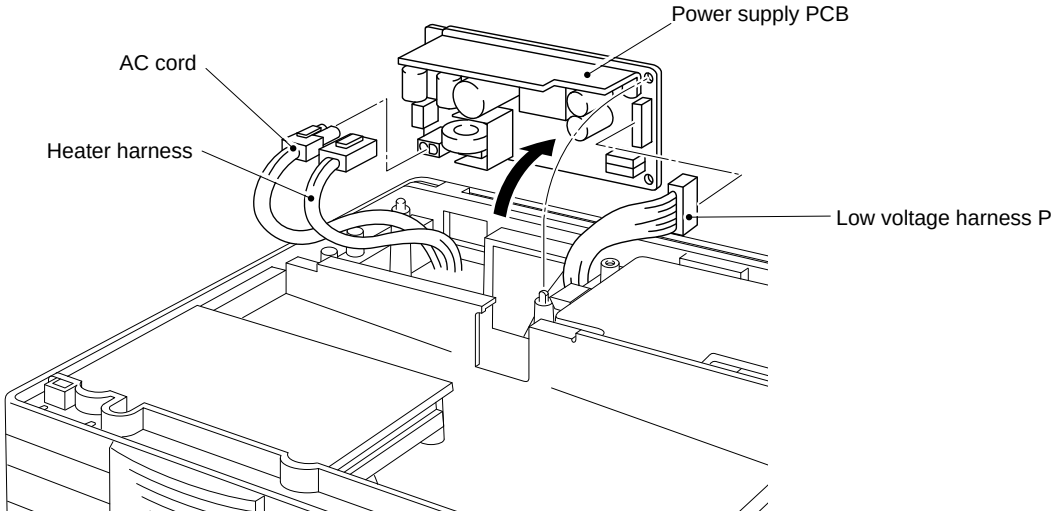


Fig. 3.23

3.21 High-voltage Power Supply

(1) Remove the screw securing the high voltage power supply PCB.

(2) Disconnect the two connectors from the PCB.

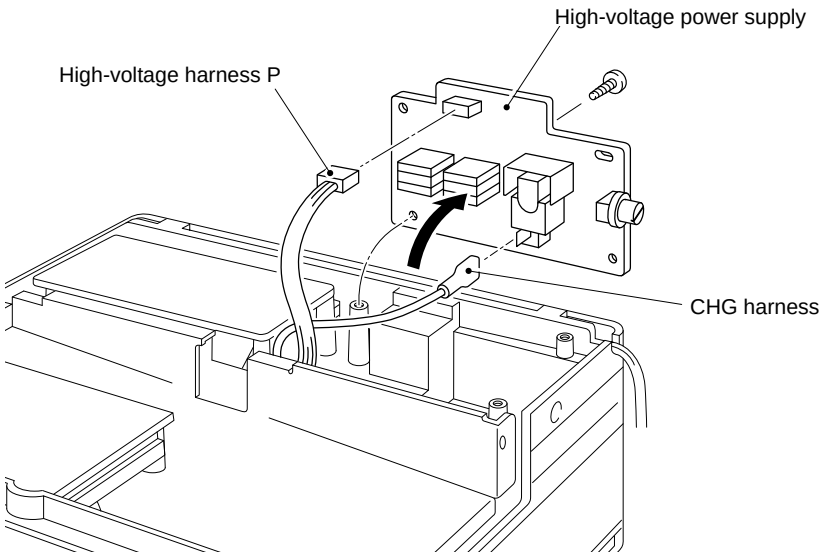


Fig. 3.24

3.22 Tray Extension

(1) Pull the manual paper tray down toward the front of the printer.

(2) Put the tray extension down toward the front of the printer, and press the bottom of its both side legs inward to release it.

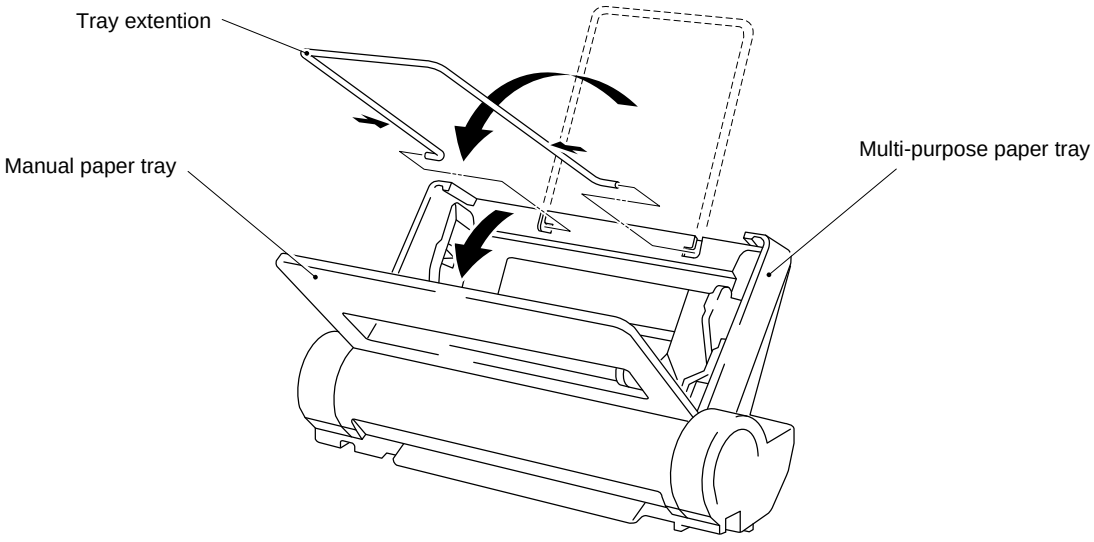


Fig. 3.25

3.23 Paper Eject Tray

(1) Open the paper eject tray.

(2) Press the both sides of hinges of the paper eject tray inward to release it from the dowels on the main cover.

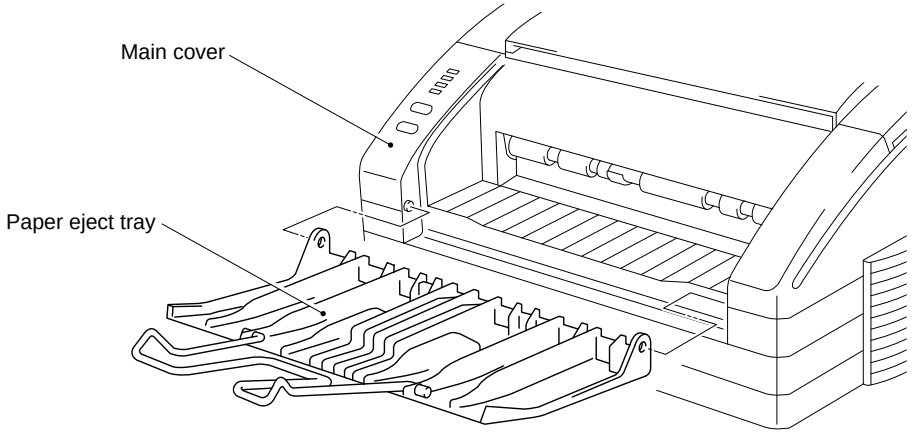


Fig. 3.26

3.24 Filter Cover

(1) Press down on the central part of the top of the filter cover and pull it out toward you to release the catch.

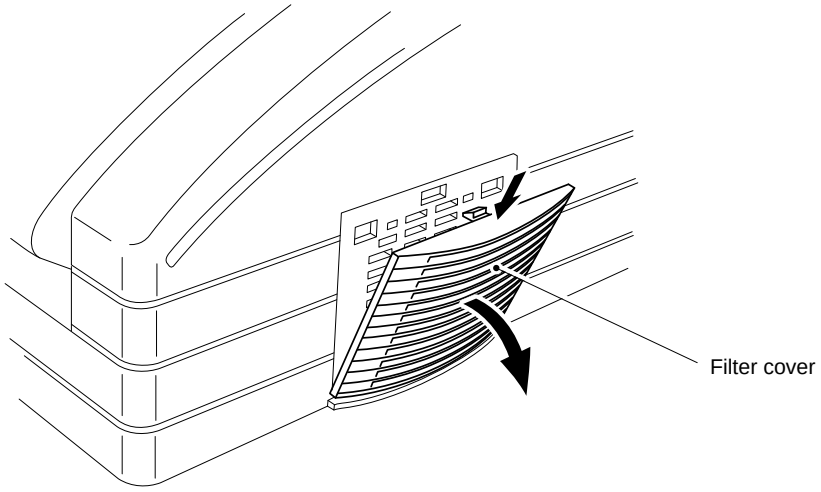


Fig. 3.27

4. PACKING

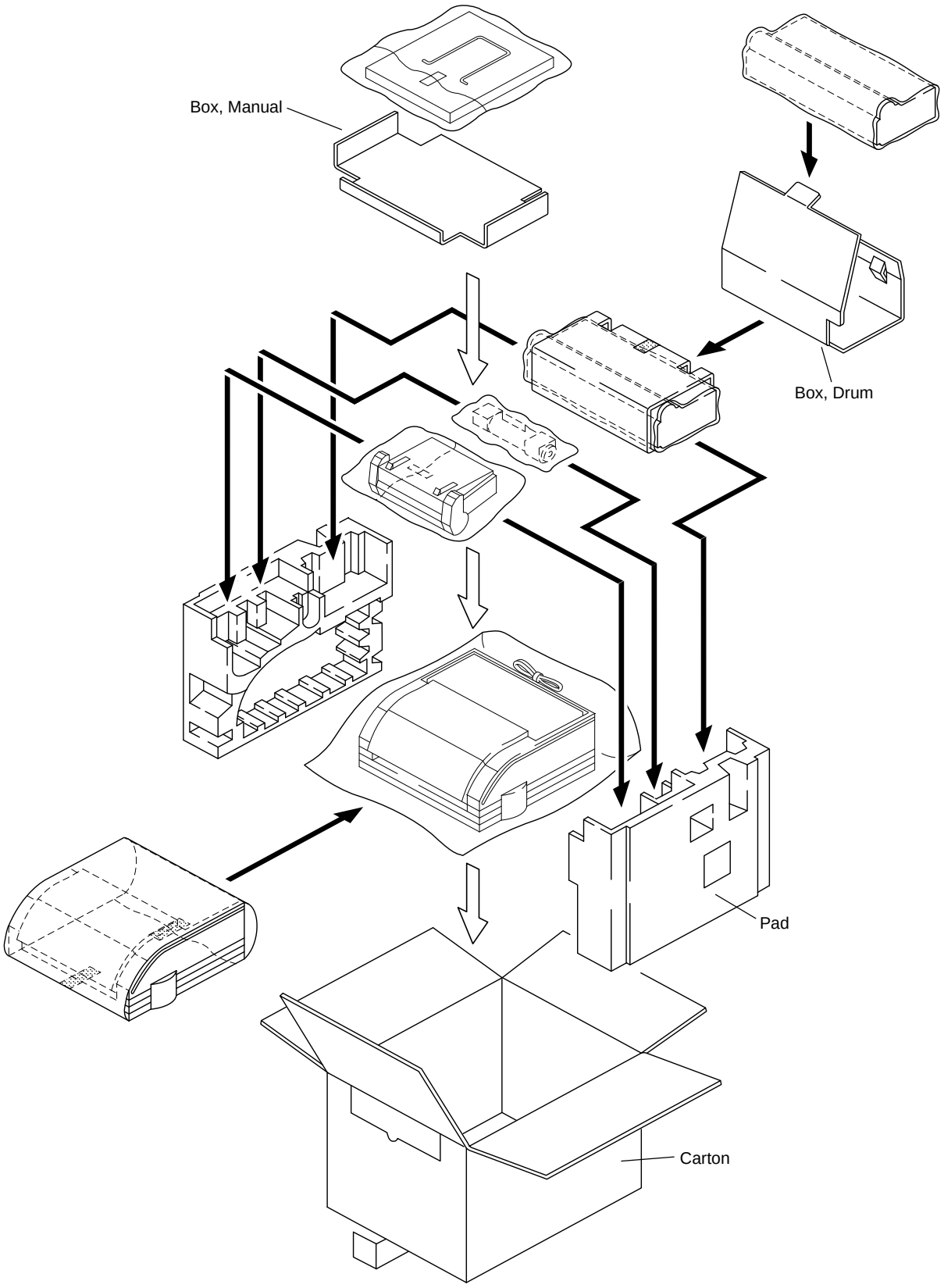


Fig. 3.28

CHAPTER IV TROUBLE SHOOTING

1 INTRODUCTION

1.1 Initial check

(1) Operating environment

Check if :

1) The souce voltage stays within ±10% from the rating voltage shown on the rating plate.

2) The printer is installed on a solid, level surface.

3) The room temperature is maintained between 10°C and 32.5°C. The relative humidity is maintained between 20% and 80%.

4) The printer is not exposed to ammonia fumes or other harmful gases.

5) The printer is not located in a hot or humid area (such as near water or a humidifier)

6) The printer is not exposed to direct sunlight.

7) The room is well-ventilated

(2) Printer paper

Check if :

1) A recommended type of print paper is being used (if the paper is too thick or too thin, or tends to curl, paper jams or paper feed problems may occur, or prints may be blurred).

2) the print paper is damped. [If so, use fresh paper, and check whether the print quality improves or not.]

(3) Consumables

Check if :

1) The toner LED is not lit on the display when a toner cartridge is installed in the printer. [If the above LED is lit, replace the cartridge with a new one. If blank spots occur on prints, take out the process cartridge and slowly rock it to distribute the toner evenly.]

(4) Others

Check if :

1) The transfer guide and feed guide are clean. [If not, clean them with a damp cloth.]

Condensation:

When the printer is moved from a cold room into a warm room in cold weather, condensation may occur inside the printer, causing various problems as below:

1) Condensation on the optical surface such as the scanning mirror, lenses, the reflection mirror and the protection glass may raise the print image to be light.

2) If the pfotosensitive drum is cold, the electrical resistance of the photosensitive layer gets high, making it impossible to obtain a correct contrast in printing.

3) Condensation on the corona unit may cause corona leakage.

4) Condensation on the pick-up guide and feed guide plates may cause paper feed troubles .

If condensation has occured, wipe the effected units or parts with a dry cloth.

If the process cartridge is unsealed soon after moved from a cold room to a warm room, condensation may occur inside the cartridge, which may cause incorrect image. Instruct the user to allow the cartridge to come to to room temperature before unsealoing it. This will take one to two hours.

1.2 Basic Procedure

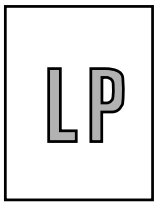
If a manufunction or incorrect print is appeared, make an initial check, then follow the basic procedure below:

(1) Check the error lamps according to the procedure of inspection mode described on the later pages of this section. If no error lamp is lit, see Section 4 for troubleshooting.

(2) If any incorrect image is found, follow the imafe defect description in this section.

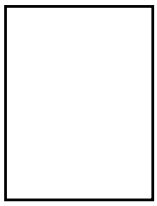
2. IMAGE DEFECTS

2.1 Image Defect Example

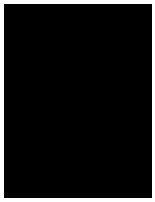


1-1 Light

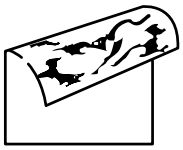
1-2 Dark



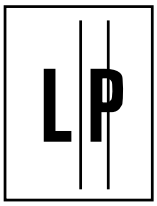
1-3 Completely blank



1-4 All black



1-5 Dirt back of paper

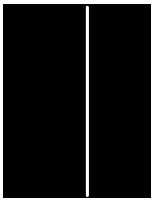


1-6 Black vertical streaks

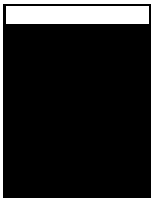
1-6 Black and blurred vertical stripes

1-7 Black and blurred horizontal stripes

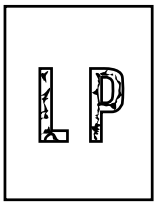
1-8 Dropout



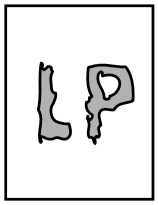
1-9 White vertical streaks



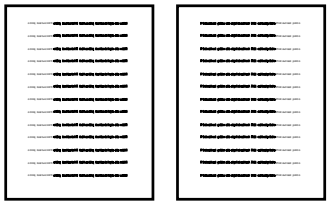
1-10 Faulty registration



1-11 Poor fixing



1-12Å@mage distortion



1-13 Blurred at either side

Fig. 4.1

2.2 Troubleshooting Image Defect

Procedures to follow in response to specific image defects.

I-1	Light

Possible cause	Step	Check	Result	Remedy
Poor contrast	1	Is the contrast adjustment dial in the center of click position?	No	Set it to the center click position or reasonable position.
Toner sensing failure (toner cartridge side)	2	Is the problem solved when 4 or 5 pages are printed after the cartridge is replaced with a full one?	Yes	The wiper of the toner cartridge is defective. Replace the toner cartridge.
Toner sensing failure (printer side)	3	Can printing be started with the drum unit removed?	Yes	Toner sensor failure. Check if the toner sensor needs cleaning and check the toner sensor connection.
Drum GND connection failure	4	Is the drum shaft grounded when the drum unit is installed?	No	Clean contact electrodes between the printer body and the drum shaft of drum unit .
Transfer electrode contact failure	5	Is there continuity between the transfer roller shaft and the transfer electrode on the external drum unit?	Yes	Replace the drum unit.
Transfer failure	6	Is the problem solved when the transfer roller is replaced?	Yes	Replace the drum unit.
Developing bias contact failure	7	Are the developing bias contacts between the printer body and the drum unit soiled?	Yes	Clean the terminals of both sides.
High-voltage power supply failure	8	Remove the main cover and measure the voltage at the electrode plate at the right side face while printing with the interlocks defeated. Is the voltage correct?	No	Check the harness connection between the high-voltage power supply and the driver PCB. If the connection is normal, replace the high-voltage power supply PCB.
Driver PCB failure	9	Perform the same check as step 8 above.	No	Replace the driver PCB.

I-2	Dark

LP

Possible cause	Step	Check	Result	Remedy
Contrast failure	1	Is the contrast adjustment dial at the center click position?	No	Set it to the center click position or reasonable position.
Corona failure (soiled wire)	2	Is the corona wire soiled?	Yes	Clean the corona wire.
Corona failure (contact failure)	3	Are the corona electrodes between the printer body (bottom plate spring) and drum unit soiled? Is the bottom plate spring normal?	No	Clean both electrodes. If the spring is abnormal, replace it.
Drum unit failure	4	Is the problem solved when the drum unit is replaced?	Yes	Replace the drum unit with a new one.

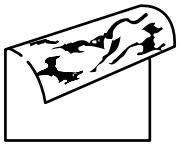
I-3	Completely blank

Possible cause	Step	Check	Result	Remedy
Developing bias contact failure	1	Are the developing bias contacts between the printer body and drum unit soild ?	Yes	Clean the electrodes at both sides.
Scanner harness connection failure	2	Is the scanner LD control harness connected normally? Is there any play in the connection?	Yes	Connect the connector correctly.
Main/driver PCB connection failure	3	Are printing signals being input to the scanner?	No	Replace the main PCB or driver PCB.

I-4	All black

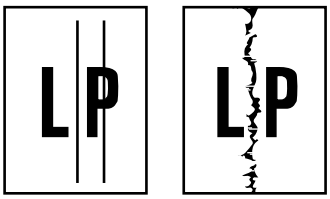
Possible cause	Step	Check	Result	Remedy
Corona failure	1	Is the drum unit corona wire broken?	Yes	Replace the drum unit.
Ditto	2	Are the charging terminal spring at the printer body side and the electrode on the bottom face of the drum unit, dirty?	Yes	Clean the charging wire at the both sides.
Ditto	3	When printing is performed with the interlocks defeated, is the specified voltage measured at the charging spring at the printer body side ?	No	Check the connection of the harness between the high-voltage power supply and the driver PCB.
Ditto	4	Perform the same check as step 3.	No	Replace the driver PCB.

I-5	Dirt back of paper



Possible cause	Step	Check	Result	Remedy
Soiled fixing unit	1(A)	Is the area of about 50mm from the top on the back of paper soiled?	Yes	Replace the drum unit.
	1(B)	Is other area rather than the above soiled?	Yes	Replace the fixing unit.
Soiling of the transfer roller	2	Is the transfer roller soiled?	Yes	Replace the drum unit.
Fogging	3	Is the back of the paper fogged?	Yes	See item 1-2.

I-6	Black vertical streaks	Black and blurred vertical stripes



Possible cause	Step	Check	Result	Remedy
Drum unit failure	1	Is the vertical streak about 1 ~ 5 length at 94mm internals?	Yes	Replace the drum unit.
Soiling of the paper feed system	2	Is the paper tray or feed system on the drum unit soiled with toner?	Yes	Clean the toner off.
Corona failure	3	Has the corona wire cleaner failed to return to its home position? Are each area around 10mm from the both side of paper soiled with faint black streaks?	Yes	Return the wire cleaner to its home position.
Corona failure	4	Is the corona wire soiled?	Yes	Clean the corona wire.
Scratch on the drum	5	Is the surface of the drum scratched?	Yes	Replace the drum unit.
Cleaning failure	6	Is the drum surface soiled is streakily?	Yes	Replace the drum unit.
Scratch on the fixing unit	7	Is the drum surface still soiled streakily even after replacing the drum unit?	Yes	Replace the fixing unit.

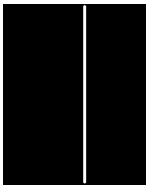
I-7	Black and blurred horizontal stripes

Possible cause	Step	Check	Result	Remedy
Scratch on the drum	1	The horizontal stripes at 94 mm intervals?	Yes	Replace the drum unit
Toner stuck on the sleeve	2	The horizontal stripes at 45 mm intervals?	Yes	Print several sheets and see what happens. The problem will be cured itself after a while.
Scratch on the fixing roller	3	The horizontal streaks at 64 mm intervals?	Yes	Replace the fixing unit.

I-8	Dropout

Possible cause	Step	Check	Result	Remedy
Transfer failure	1	Is the pressure spring of the upper shoot cover come off?	Yes	Re-fit the spring.
			No	Replace the drum unit.
High-voltage power supply failure	2	Remove the main cover and measure the voltage at the transfer electrode plate at the right side while printing with the interlocks defeated. Is the voltage correct?	Yes	Check the harness connection between the high-voltage power supply and the driver PCB. If the connection is normal, replace the high-voltage power supply PCB.

I-9	White vertical streaks

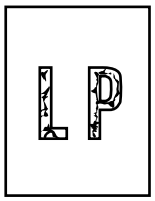


Possible cause	Step	Check	Result	Remedy
Scanner soiling	1	Is the window of scanner soiled?	Yes	Clean the window with a dry tissue.
			No	Replace the tdrum unit as the transfer roller may be scratched.

I-10	Faulty registration

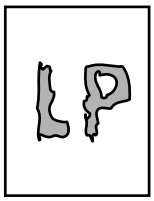
Possible cause	Step	Check	Result	Remedy
Excessive paper load	1	Is the amount of paper more than 22mm thick (in thickness) loaded to the paper tray?	Yes	Instruct the user to keep paper loads below 22 mm in thickness.
Print paper	2	Is the specified weight of the recommended paper being used?	No	Instruct the user to use the recommended types of paper.
	3	Is the first printing position within ±1mm of the tolerance specification?	Yes	Adjust the Y offset by using the utility software supplied.
Top of form sensor position failure	4	Is the position of the top of form sensor normal?	No	Reposition the sensor to the normal position.

I-11	Poor fixing



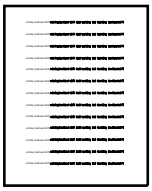
Possible cause	Step	Check	Result	Remedy
Printing paper	1	Is thick paper more than 36 lb. being used?	Yes	Instruct the user to use paper of the recommended thickness.
Toner sensing failure	2	Is the problem solved by replacing the drum unit or the toner cartridge? (When printing is faint.)	Yes	The carrier of the developer is leaking. As toner sensing is defective, clean the toner sensor. If the wiper of the toner cartridge is broken, replace the toner cartridge with a new one.
Fixing unit nip failure	3	Is the nip width in the fixing unit insufficient? Is the nip release arm (joined to the top cover) connected?	Yes	Correct the nip release arm to normal.
Thermistor failure	4	Measure the temperature of heater surface during printing. Is the temperature correct (150 °C) ?	No	Replace the fixing unit.

I-12	Image distortion



Possible cause	Step	Check	Result	Remedy
Scanner	1	Is the scanner unit secured to the frame normally? Is there any play?	Yes	Secure the unit normally with the screws.
Scanner LD emission failure Scanner motor rotation failure	2	Is the laser potion or the scanner motor defective?	Yes	Replace the scanner unit.
Scanner connection failure	3	Is the scanner harness connected normally? Is it coming loose?	Yes	Connect the harness tightly.

I-13	Blurred at either side



Possible cause	Step	Check	Result	Remedy
Leaning of the printer	1	Is the printer placed horizontally?	No	Place the printer on a flat table.
Drum unit	2	Is the problem happened just after replacing the drum unit with a new one?	Yes	Remove the drum unit, hold the unit horizontally and tap it against a flat table 3-4 times.

3. TROUBLESHOOTING OF MALFUNCTIONS

When carrying out the countermeasures for malfunctions described in this section, make sure to check connectors for contact failure before measuring the voltage at specified connector pins.

M-1	No AC power supplied

Possible cause	Step	Check	Result	Remedy
Supply voltage	1	Is the correct voltage present at the outlet?	No	Inform the user that the correct voltage is not supplied at the outlet.
Power plug	2	Is the power cord securely plugged into the outlet?	No	Plug the power cord securely into the outlet.
Fuse (F1)	3	Is the fuse blown?	Yes	If the fuse blows again immediately after replacing the fuse or plugging in the power cord, check if there is a short circuit somewhere in the AC power supply line.
Wiring	5	Unplug the power supply plug. Is there a broken wire between the AC input connector of the low-voltage power supply and the power plug?	Yes	Replace the AC power cord.

M-2	No DC power supplied

<table>
<tr><th>Possible cause</th><th>Step</th><th>Check</th><th>Result</th><th>Remedy</th></tr>
<tr><td>AC power supply</td><td>1</td><td>Is AC power supplied between connectors CN1-L and CN1-N when the power plug is plugged into the outlet?</td><td>No</td><td>Follow the same check procedure of M-1 "No AC power supplied".</td></tr>
<tr><td>Wiring,
DC load</td><td rowspan="2">2</td><td rowspan="2">Turn the power switch OFF and disconnect the P2 connector (driver PCB).
Turn the micro switch on the power supply PCB ON and measure the voltages between the terminals.
Do the measured voltage satisfy the prescribed value in the table below?
<table>
<tr><th>PCB</th><th>+ lead pin</th><th>- lead pin</th><th>Voltage</th></tr>
<tr><td rowspan="4">Driver</td><td>P2-1</td><td>P2-4</td><td>Approx. 24 V</td></tr>
<tr><td>P2-3</td><td>P2-5</td><td>Approx. 24 V</td></tr>
<tr><td>P2-8</td><td>P2-6</td><td>Approx. 5 V</td></tr>
<tr><td>P2-10</td><td>P2-6</td><td>Approx. 5 V</td></tr>
</table></td><td>Yes</td><td>Turn the power switch OFF, connect the connector disconnected, and turn the power switch ON again.
If the protector circuit is activated, check the connector, the wiring from the connector, and the DC load.</td></tr>
<tr><td>Power supply input unit</td><td>No</td><td>Replace the power supply input unit.</td></tr>
</table>

M-3 Main motor unrotated

<table>
<tr><th>Possible cause</th><th>Step</th><th>Check</th><th>Result</th><th>Remedy</th></tr>
<tr><td>Connection failure of connector</td><td>1</td><td>Is the connection of connector P3 on the driver PCB correct?</td><td>No</td><td>Reconnect the connector.</td></tr>
<tr><td>Main motor (M1)</td><td rowspan="2">2</td><td rowspan="2">Disconnect connector P3 from the driver PCB.
Measure the resistance between the connector J210 pins of the main motor by using a circuit tester.
Do the measured resistance satisfy the prescribed value in the table below?
<table><tr><td>P3-1 and P3-2</td><td>Approx. 13 Ω</td></tr><tr><td>P3-3 and P3-2</td><td>Approx. 13 Ω</td></tr><tr><td>P3-4 and P3-5</td><td>Approx. 13 Ω</td></tr><tr><td>P3-5 and P3-6</td><td>Approx. 13 Ω</td></tr></table></td><td>No</td><td>Replace the Main motor</td></tr>
<tr><td>Driver circuit</td><td>Yes</td><td>Replace the driver PCB.
Replace the Main PCB.</td></tr>
</table>

M-4 No paper supplied

<table>
<tr><th>Possible cause</th><th>Step</th><th>Check</th><th>Result</th><th>Remedy</th></tr>
<tr><td>Connection failure of connector</td><td>1</td><td>Is the contact of connector P9 on the driver PCB good?</td><td>No</td><td>Reconnect the connector.</td></tr>
<tr><td>Driver circuit</td><td rowspan="2">2</td><td rowspan="2">Set paper on the manual paper tray and press the test print button on the operation panel.
Does the voltage between pins 4 (PICKUP) and 1 (GND) of the P9 connector on the driver PCB change from approx. 24 VDC to 0 V within the specified time?</td><td>No</td><td>Replace the driver PCB.</td></tr>
<tr><td>Paper pick-up clutch solenoid (SL501)</td><td>Yes</td><td>Replace the paper pick-up solenoid.</td></tr>
</table>

M-5	Insufficient output from high-voltage power supply unit

Possible cause	Step	Check	Result	Remedy
High voltage contact	1	Do any of the terminals on the high-voltage contact have soiling or contact burns?	Yes	Clean the high-voltage contact.
High-voltage power supply failure	2	Remove the main cover and measure the voltage at each of the high-voltage terminal plates at the right side. Is the specified voltage measured?	No	Check the connection of the harness between the high-voltage power supply and the driver PCB. If normal, replace the high-voltage power supply PCB.

M-6	Fixing heater temperature not adjusted

Possible cause	Step	Check	Result	Remedy
Poor thermistor harness contact	1	Is the connection of the connectors on the paper eject sensor PCB and the driver PCB correct?	No	Connect the connectors securely.
Blown thermal fuse	2	Remove the fixing unit and measure the resistance between the input connectors. Is it open?	Yes	Replace the fixing unit.
Thermistor failure	3	Is the thermistor installed normally?	No	Replace the fixing unit.

M-7	BD failure

Possible cause	Step	Check	Result	Remedy
Harness connection failure	1	Is the connection of connector P6 on the driver PCB correct?	No	Connect it securely.

M-8	Scanner failure

Possible cause	Step	Check	Result	Remedy
Harness connection failure	1	Is the connection of the scanner motor connector and connector P7 on the driver PCB correct?	No	Connect the connectors securely.
Power supply input @	2	Is the voltage between pins 5 (+24 VDC) and 4 (GND) of connector P7 on the driver PCB measured 24 VDC?	No	Check if +24 VDC is supplied between pins 1 (+24 VDC) and 3 (GND) of connector P2 on the driver PCB. If not, check the power supply input.
			Yes	Replace the scanner block.

F-1 Double feeding

Possible cause	Step	Check	Result	Remedy
Paper	1	Is the paper of a recommended type used?	No	Instruct the user to use the recommended types of paper.
Separation pad	2	Is the surface of the separation pad worn?	Yes	Replace the multi-purpose tray.

F-2 Wrinkles

Possible cause	Step	Check	Result	Remedy
Paper	1	Is the paper of a recommended type used?	No	Instruct the user to use the recommended types of paper.
	2	Is the wrinkle problem solved if a new paper is used?	Yes	Instruct the user how to store paper so that it does not absorb moisture.
Paper pick-up block	3	After paper feeding, open the left cover just before the paper is fed to the fixing unit. At this time, check if the paper is wrinkled or being skewed.	Yes	Check the paper pick-up block.
Fixing unit entrance guide	4	Is the entrance guide soiled?	Yes	Clean the entrance guide.
Fixing unit	5	Are there still any wrinkles aftrer printing several blank pages?	Yes	Replace the fixing unit as the lower fixing roller may be soiled.

4. INSPECTION MODE

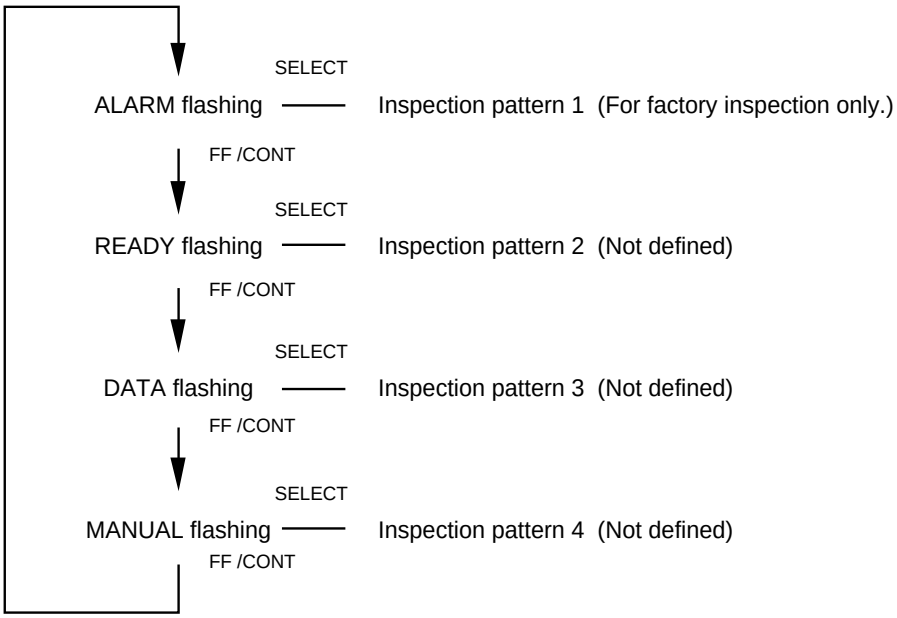
The following inspection modes are incorporated in the printer.

4.1 Inspection Mode 1

When the power code is plugged into the outlet while holding down the FF/CONT button, the printer goes to the inspection mode.

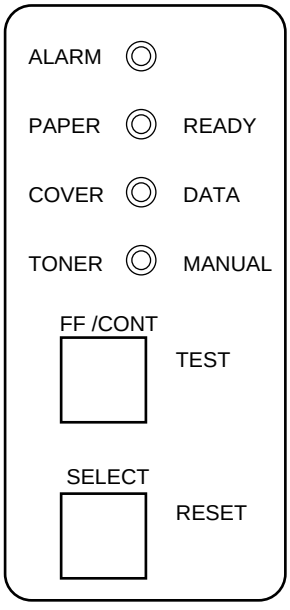
Immediately after entering this mode the ALARM LED starts to flash.

Every time the FF/CONT button is pressed, LED flushing position passes on the next. The following inspection pattern are assigned to the respective LED. By pressing the SELECT button the currently selected inspection mode comes into effect.



4.2 Inspection Pattern 1

This is for the program used for inspection in the factory.
It is used to cheek if the printer's sensors are functioning correctly, after then this test printing is performed.



On entering this inspection mode, the LEDs show the statuses of the respective sensors.

ALARM LED

Indicates the status of the paper eject sensor:
ON : Paper exist on the paper eject part.
OFF: No paper exist on the paper eject part.

PAPER LED

Indicates the status of the registration sensor:
ON : The registration sensor is ON.
OFF: The registration sensor is OFF.

COVER LED

Indicates the status of the cover switch:
ON : The cover is open or the sheet feeder is not installed.
OFF: The cover is closed and the sheet feeder is installed.

TONER LED

Indicates the status of the toner empty sensor:
ON : The toner cartridge is not installed or the toner is almost empty in it.
OFF: The toner cartridge is installed.

If the SELECT switch is pressed while all the LEDs are ON, the test printing pattern for the inspection is printed in three pages.

The inspection procedure is as follows:

(1) Inspection will be started when:

No sheet feeder is installed.

No drum unit is installed.

No toner cartridge is installed.

The top cover is open.

(2) Plug the power plug into the outlet while holding down the FF/CONT button.

(3) The ALARM LED will start to flash.

(4) Press the SELECT button. Inspection pattern 1 will start.

(5) Check if all the LEDS light once and then the ALARM and PAPER LEDs go OFF.
If the paper eject sensor is ON at this time, the ALARM LED will be ON (error).
If the registration sensor is ON at this time, the PAPER LED will be ON (error).

(6) Pressing down the registration sensor actuator, check if the PAPER LED comes ON.

(7) Install the drum unit.

(8) Install the toner cartridge, and check if the TONER LED goes OFF.

(9) Close the top cover.

(10) Install the sheet feeder, and check if the COVER LED goes OFF.

(11) Check if all the LEDs are OFF.
If all the LEDs are OFF, the sensors are correct.

(12) Set paper in the sheet feeder.

(13) Pressing the SELECT button, three pages of the inspection pattern will be printed.

(14) Power OFF (Unplug the power cord).

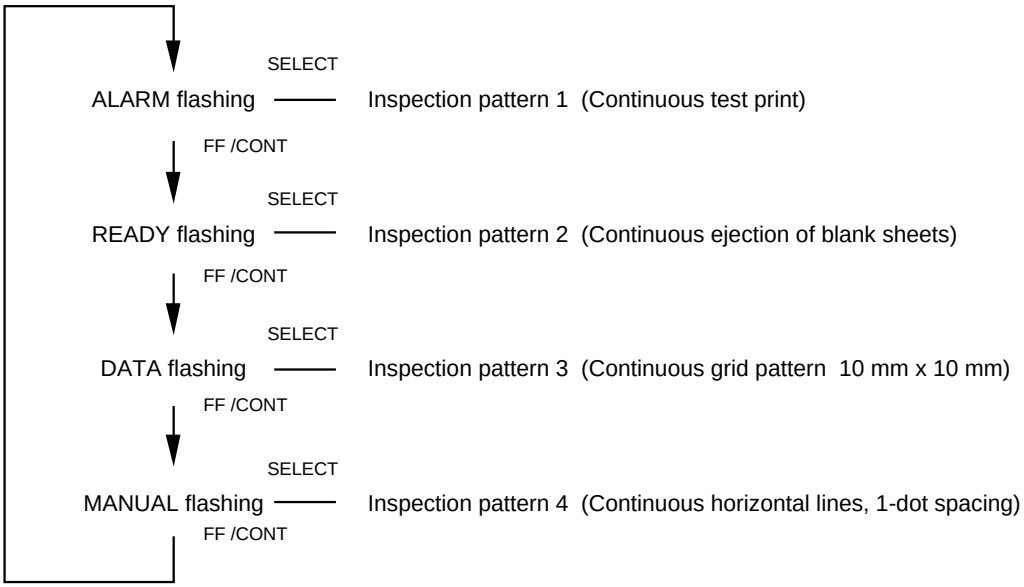
This completes the inspection procedure.

4.3 Inspection mode 2

When the power code is plugged into the outlet while holding down the SELECT button, the printer goes to the inspection mode 2.

Immediately after entering this mode the ALARM LED starts to flash.

Every time the FF/CONT button is pressed, LED flushing position passes on the next. The following inspection pattern are assigned to the respective LED. By pressing the SELECT button the currently selected inspection mode comes into effect.



4.4 Initialization of EFPROM

The EFPROM can be returned to its factory setting by using the remote printer console supplied as an accessory, but the settings indicated below can only be made by using the special utility software:

(1) Initialization of the page counter.

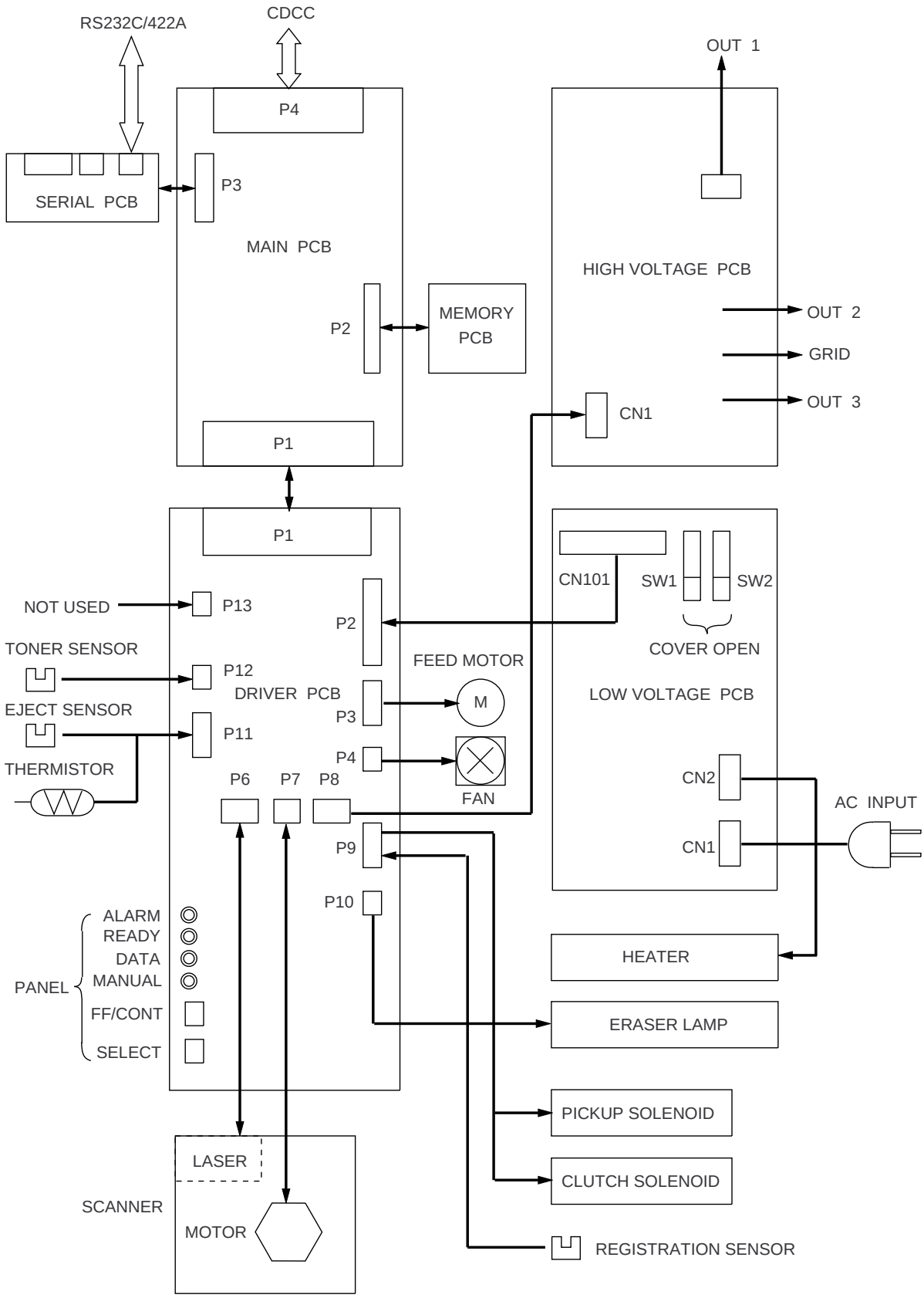
(2) Initialization of the drum life indicator.

Use the utility software for these settings.

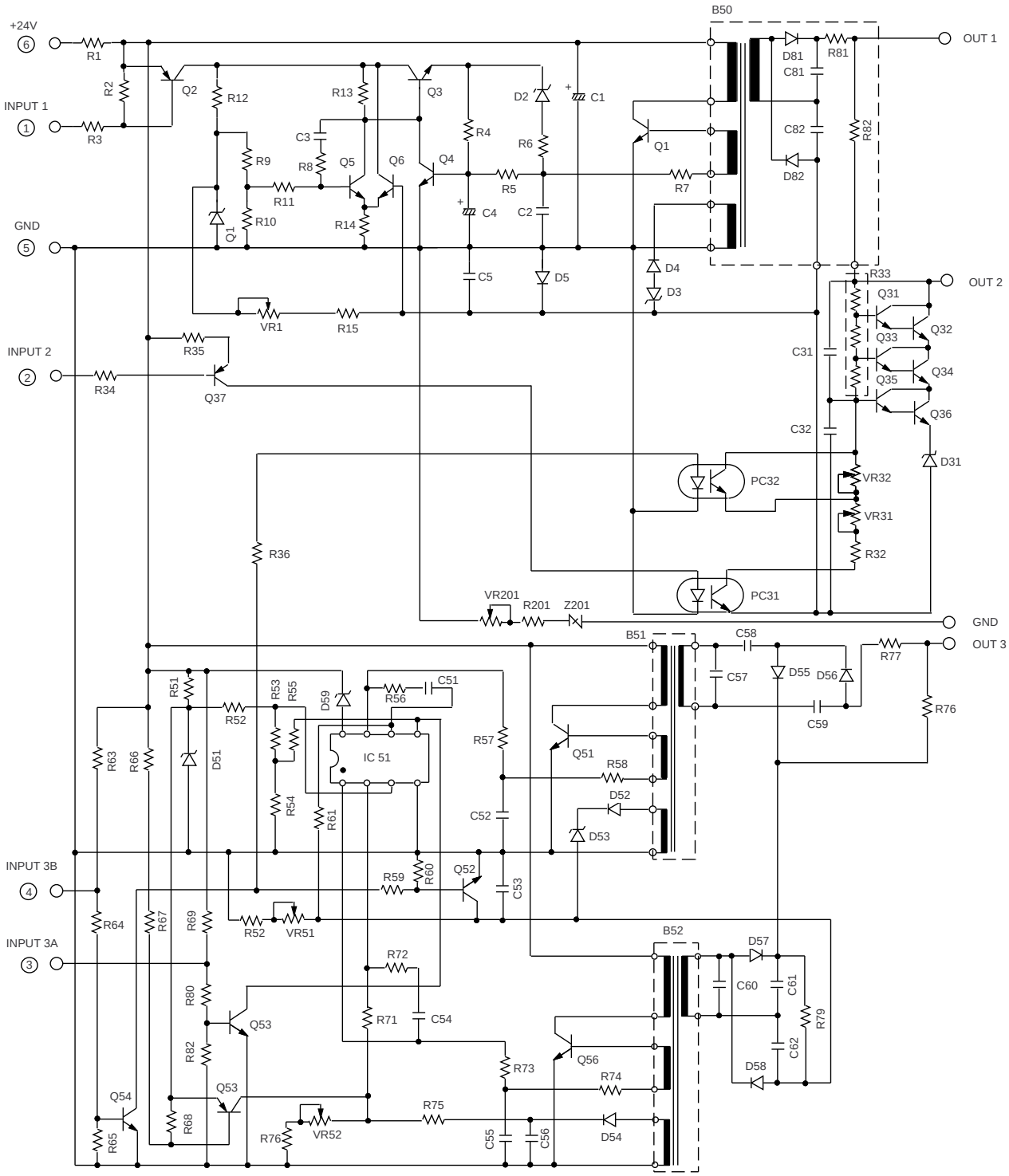
4.5 Error codes

In the event of a printer failure or a printer hang-up, the LEDs will alternate between all LED ON and displaying a specific combination of ON and OFF, which indicates the types of the failure. The types of failure and LED combinations are as follows.

Type of failure	MANUAL	DATA	READY	ALARM	
Fixing unit failure				●	
Laser scanner BD signal not detected			●		— Go to "cover open"
ROM failure		●			
DRAM failure		●		●	
SERVICE A		●	●		┐
SERVICE B		●	●	●	│
SERVICE C	●				│
SERVICE D	●			●	│ CPU hang up
SERVICE E0	●		●		│
SERVICE E1	●		●	●	│
SERVICE P	●	●			│
NV-RAM failure	●	●		●	┘

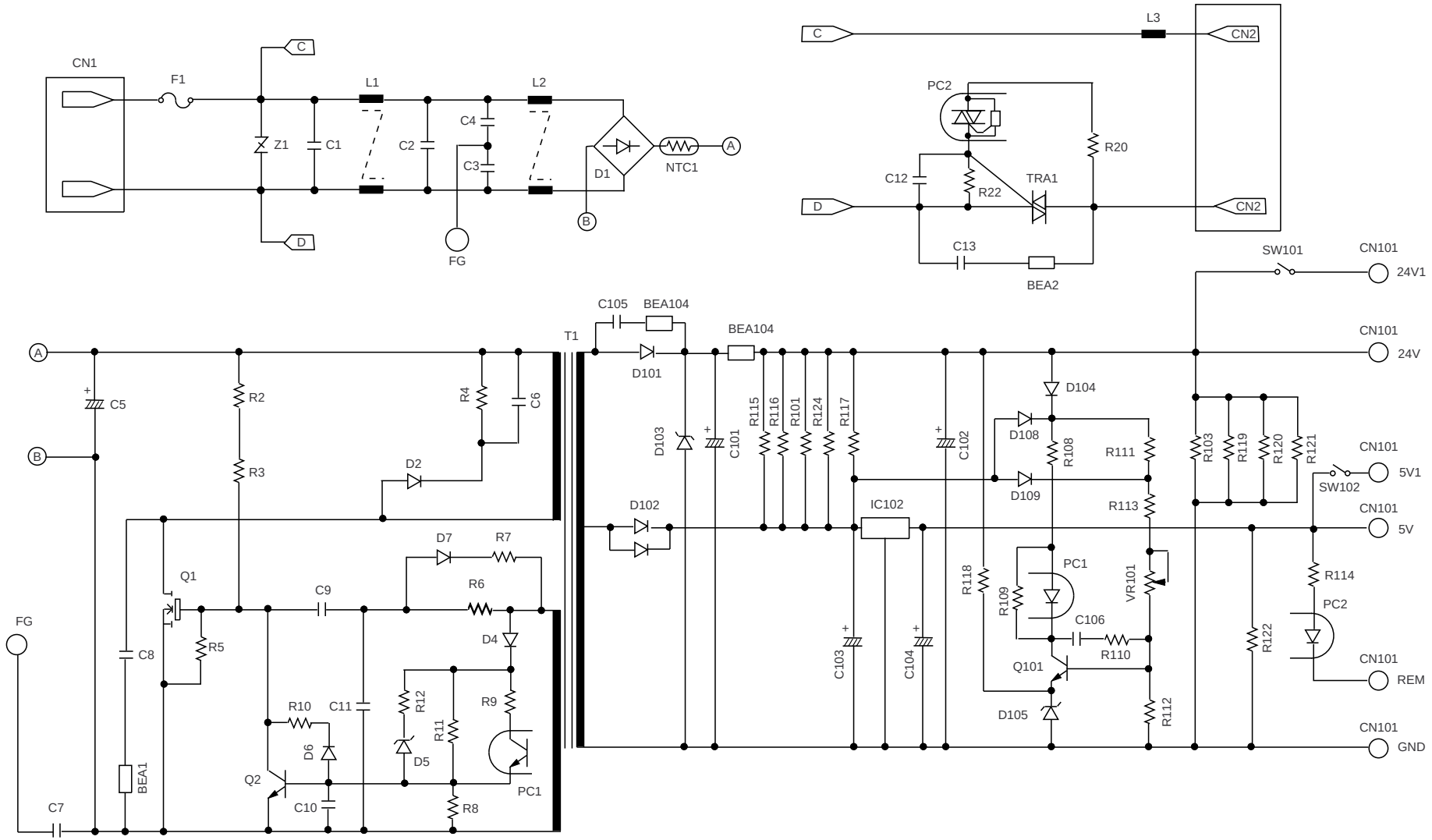


General Block Diagram

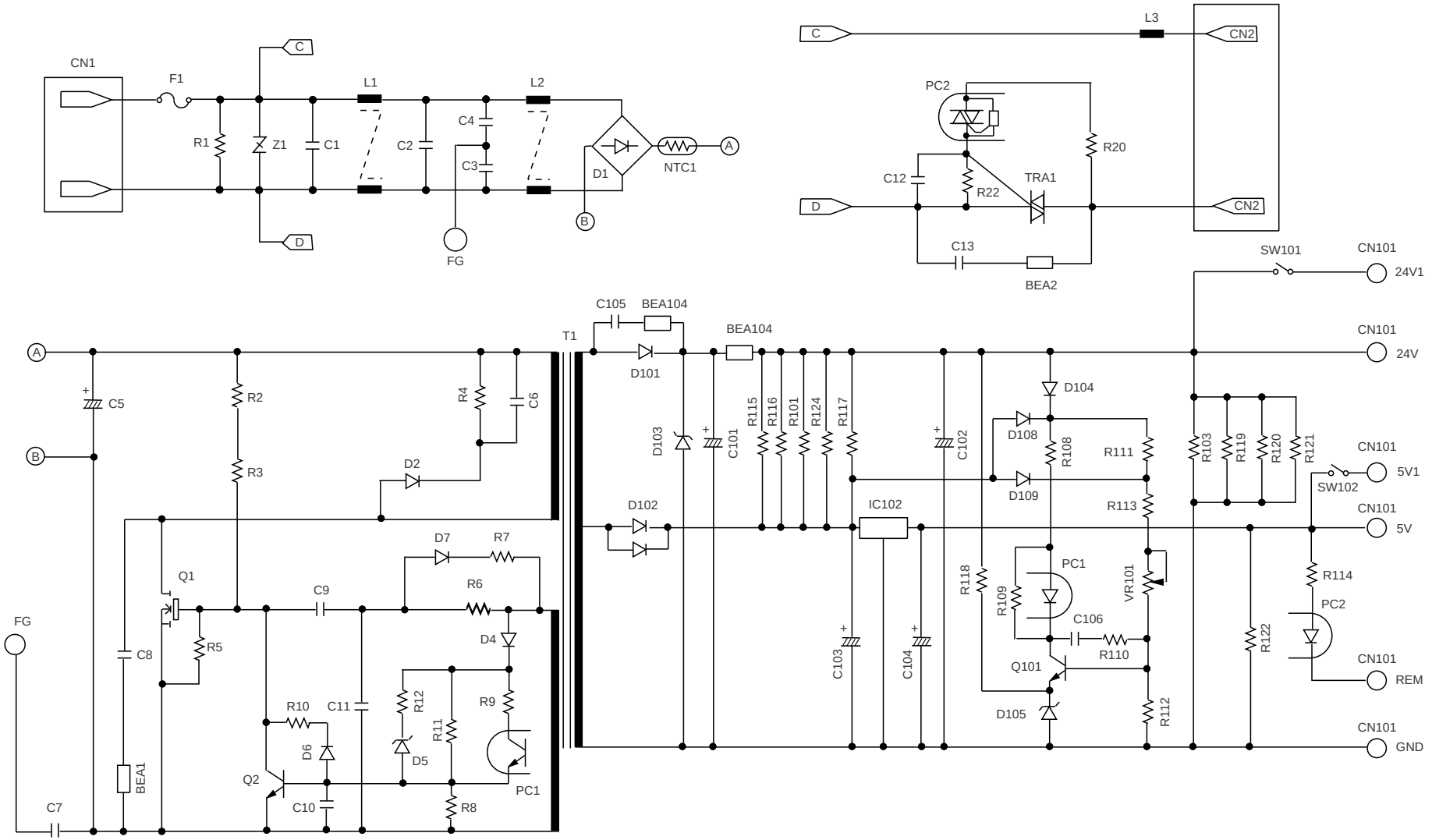


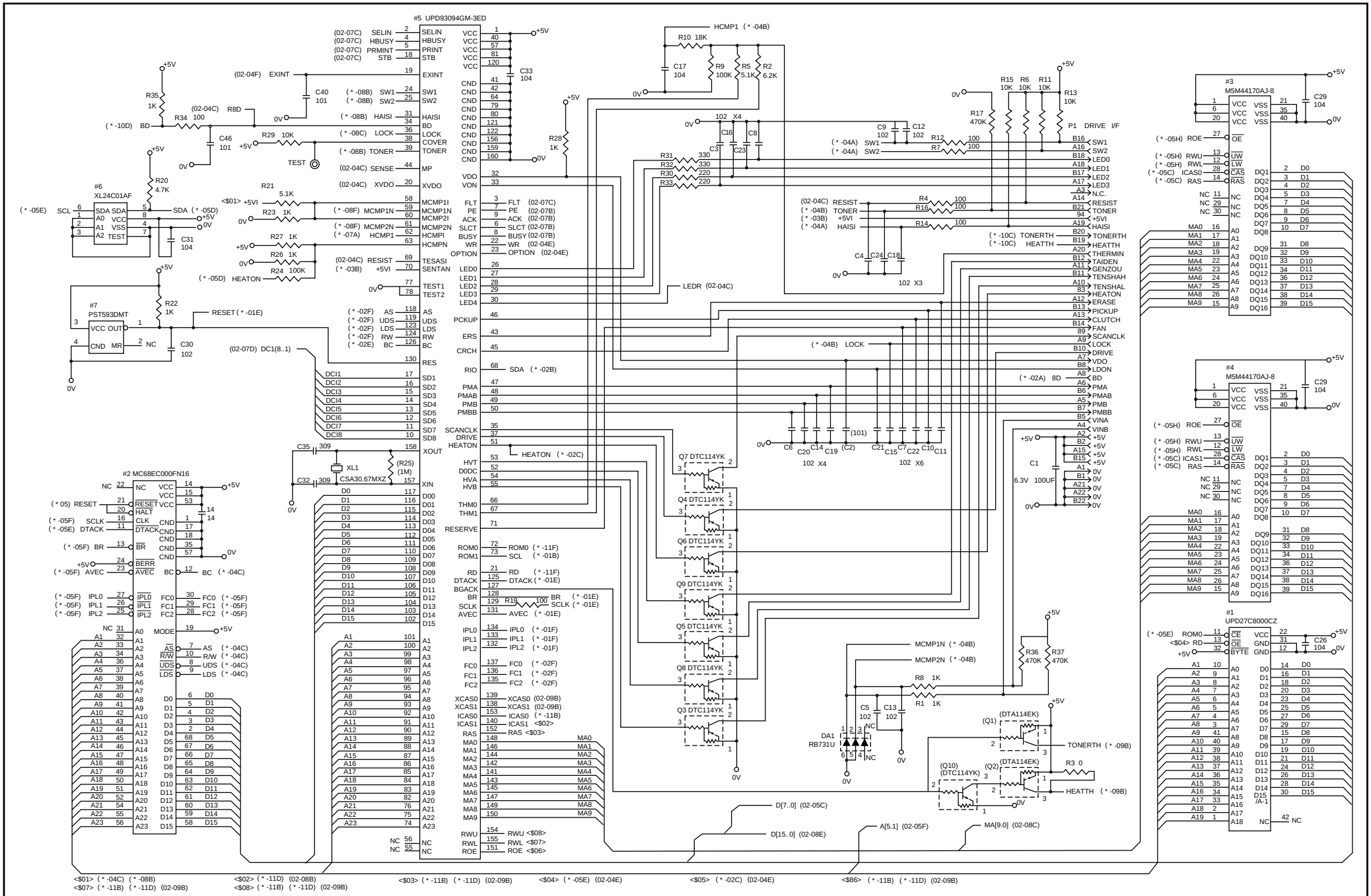
HL-XL High-Voltage PS Circuit

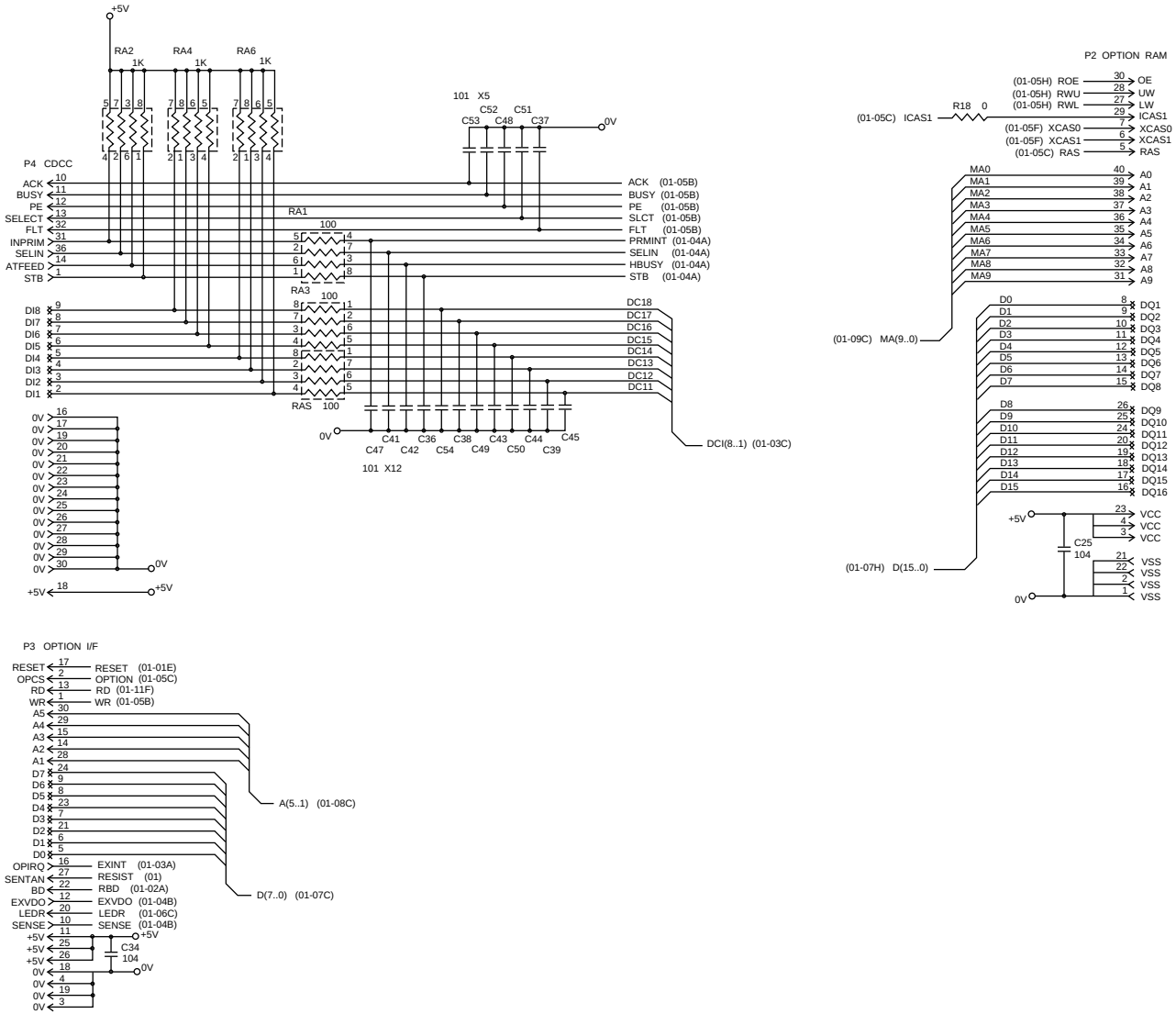
HL-XL Low-Voltage PS Circuit, 115V



HL-XL Low-Voltage PS Circuit, 230V

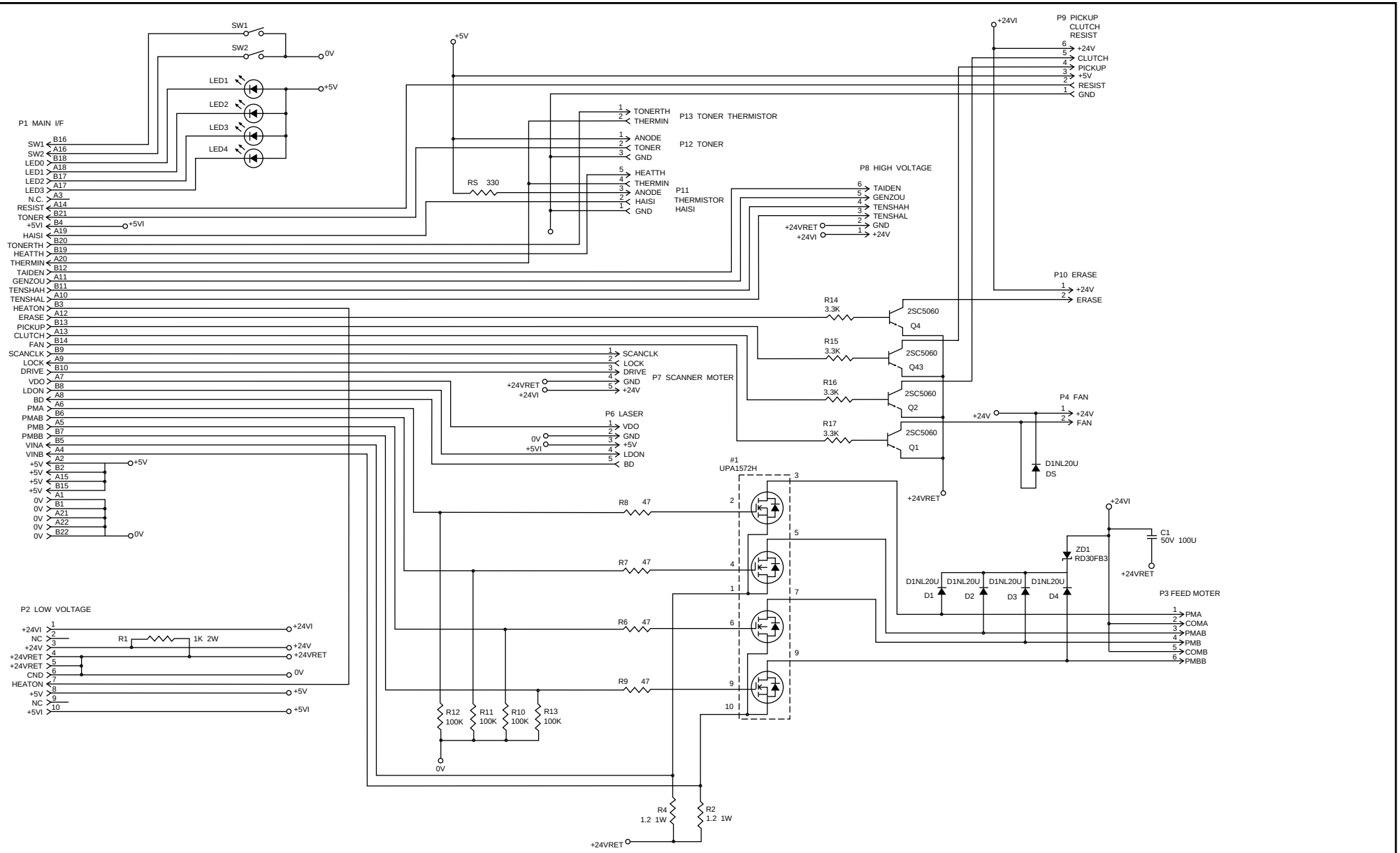



#5 UPD93094GM-3ED
#2 MC68EC000FN16
#3 M5M44170AJ-8
#4 M5M44170AJ-8
#1 UPD27C8000CZ
#6 XL24C01AF
#7 PST593DMT
P1 DRIVE I/F
HCMP1 (* -04B)
LEDR (02-04C)
HEATON (* -02C)
LOCK (* -04B)
MCMP1N (* -04B)
MCMP2N (* -04B)
TONERTH (* -09B)
HEATTH (* -09B)
D[7..0] (02-05C)
D[15..0] (02-08E)
A[5.1] (02-05F)
MA[9.0] (02-08C)
Main PCB Circuit Diagram 1



<$01> (01-04C) (01-08B)

Main PCB Circuit Diagram 2



Driver PCB Circuit Diagram

May '94
54U002NE0-HLXL
Printed in Japan

LASER PRINTER

PARTS REFERENCE LIST

HL- 600 Series

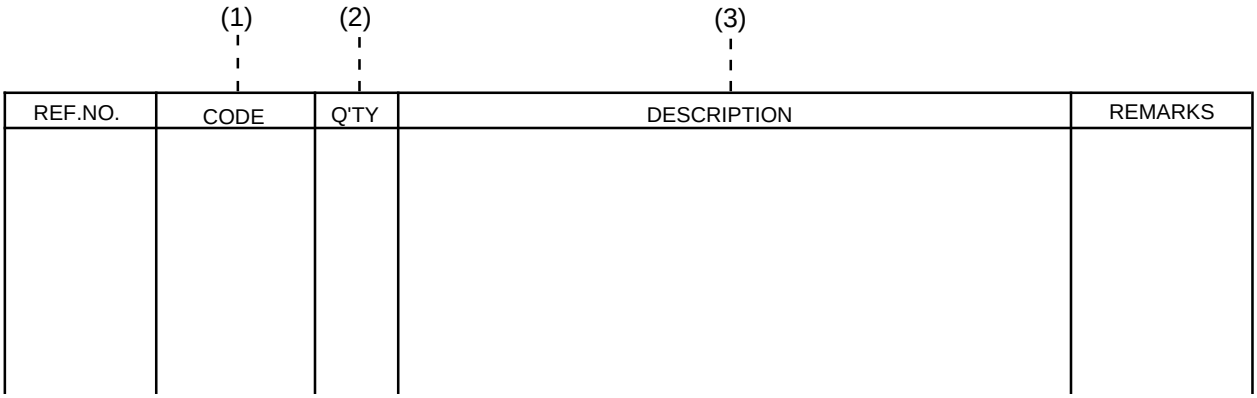
NOTE FOR USING THIS PARTS REFERENCE LIST

1.In the case of ordering parts, it needs mentioning the following items:

(1) Code
(2) Q'ty
(3) Description
(4) Revision No. (for a kind of printed circuit boards)

Note : No orders without Parts Code or Tool No. can be accepted.

< Example >



(5) Revision No. : marked on a printed ciecuit board.

2. Design-changed parts:
If the parts are changed, any one of the following symbols is indicated in the REMARKS column.

#A : compatible between old and new
#B : replaceable from old to new
#D : incompatible
: newly established

3. The original of this list was made based on the information available in September, '94.

4. Parts are subject to change in design without prior notice.

CONTENTS

1. FRAME 2
2. FRAME ATTACHMENT 3
3. SCANNER 3
4. PAPER FEEDER 4
5. PAPER EMPTY 4
6. FIXING UNIT 5
7. CABINET 5
8. MAIN PCB 6
9. DRIVER PCB 6
10. LOW POWER SUPPLY UNIT 7
11. HIGH POWER SUPPLY UNIT 7
12. POWER CORDS 8
13. ATTACHMENTS 8
14. DOCUMENTS 9
15. PACKING 9
16. ADJUSTING KIT 10

Fig.3. POWER CORDS

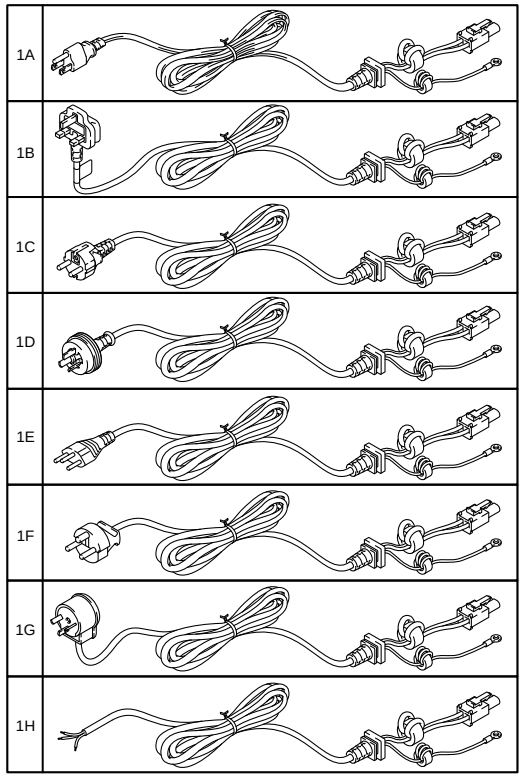


Fig.1. MAIN PCB

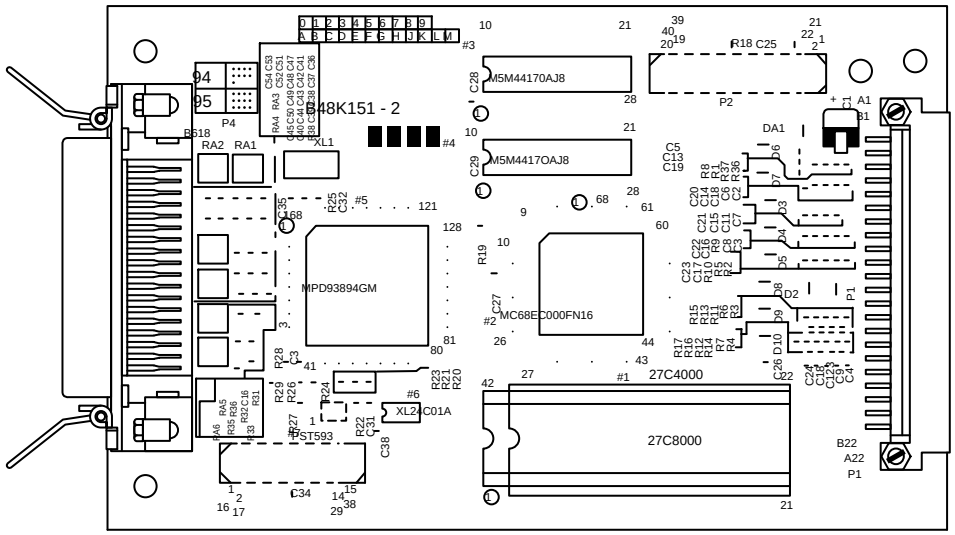
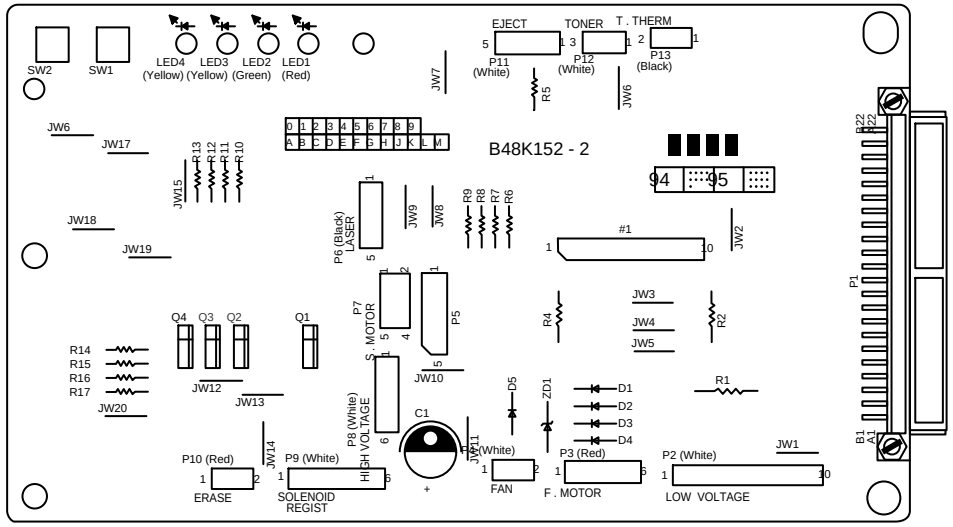
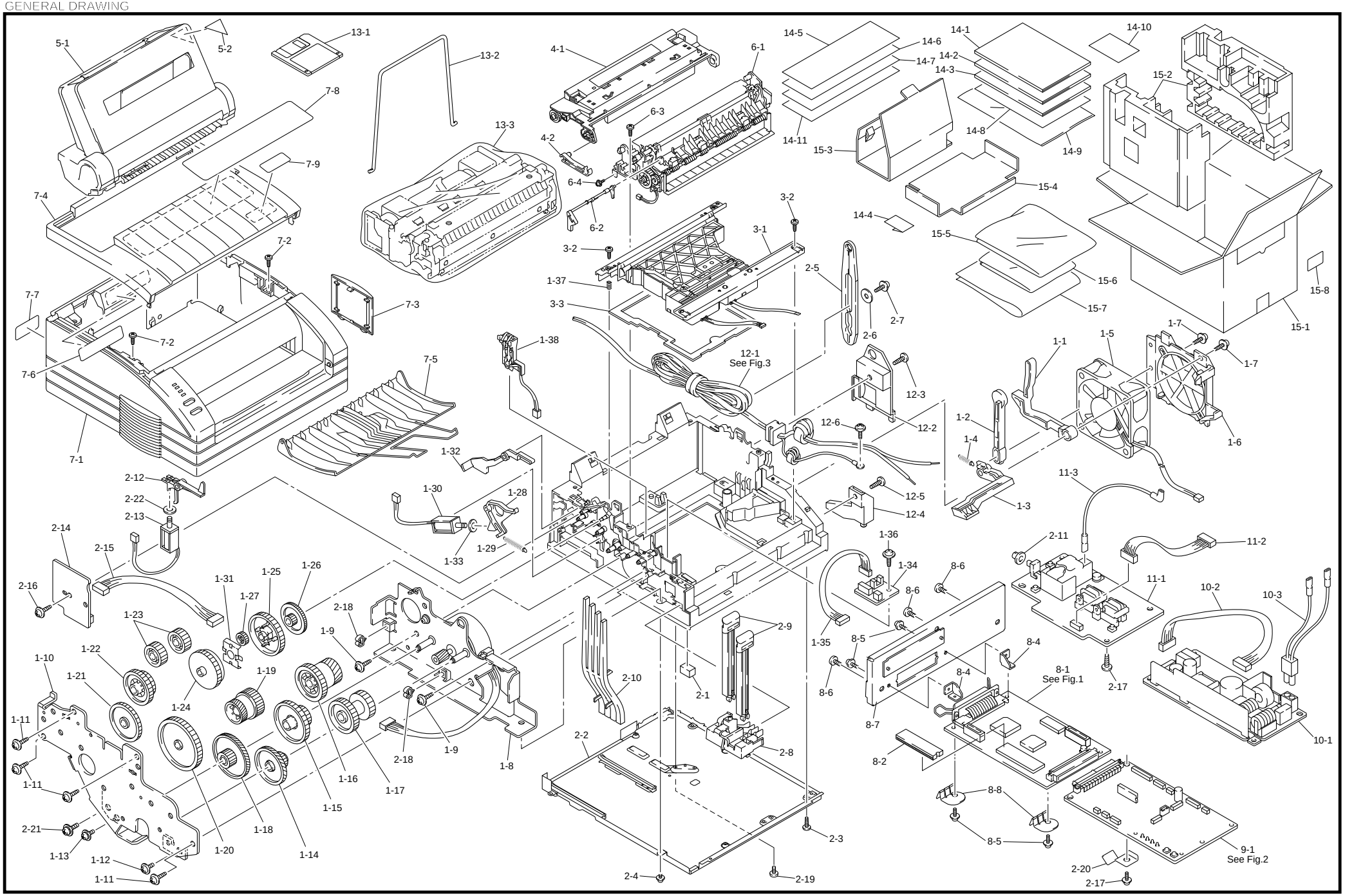


Fig.2. DRIVER PCB





MODEL HL-XL 54U-101

1 . FRAME

REF.NO.	CODE	Q'TY	DESCRIPTION	REMARKS
1	UL5009000	1	INTERLOCK LEVER, CV	
2	UL5011000	1	INTERLOCK LEVER, PENDULUM	
3	UL5012000	1	INTERLOCK LEVER, S	
4	UL5013001	1	SPRING, EXTENSION	
5	UL5008001	1	FAN MOTOR	
6	UL5044000	1	FAN GUARD	
7	087310815	2	TAPTITE, CUP B M3X8	
8	UL5019001	1	MAIN MOTOR UNIT	
9	087310815	2	TAPTITE, CUP B M3X8	
10	UL5025000	1	GEAR SHAFT PLATE	
11	087310616	4	TAPTITE, CUP B M3X6	
12	0A5300605	1	SCREW, PAN (WASHER) M3X6DB	
13	087320616	1	TAPTITE, CUP S M3X6	
14	UL5027000	1	GEAR, 23/66	
15	UL5028000	1	GEAR, 22/63	
16	UL5029000	1	GEAR, 25/40	
17	UL5030000	1	GEAR, 23/37	
18	UL5031000	1	GEAR, 17/78	
19	UL5032000	1	GEAR, 29/38	
20	UL5033000	1	IDLE GEAR, 59	
21	UL5034000	1	GEAR 20/43	
22	UL5035000	1	GEAR, 27/38	
23	UL5036000	2	IDLE GEAR, 24	
24	UL5037000	1	GEAR, 42/60	
25	UL5038000	1	CLUTCH GEAR, 47	
26	UL5039000	1	GEAR, 18	
27	UL5040000	1	CLUTCH GEAR, 21	
28	UL5041000	1	CLUTCH LEVER	
29	UF3056001	1	SPRING, EXTENSION	
30	UL5043001	1	SOLENOID C ASSY	
31	UL5050001	1	SPRING PLATE	
32	UL5087001	1	REGIST SENSOR LEVER	
33	UL5084000	1	RUBBER WASHER 12	
34	UL5024001	1	MOTOR COOLING FILM	
35	UK2151001	1	PAPER EJECT SENSOR PCB ASSY	
36	UK2211001	1	PAPER EJECT SENSOR HARNES ASSY	
37	087310815	1	TAPTITE, CUP B M3X8	
38	UL5015001	1	ERASE LAMP FEEDER HOLDER ASSY	
39	UL5049000	1	SPRINTG, COMPRESSION	

MODEL HL-XL 54U-101-010

2 . FRAME ATTACHMENT

REF.NO.	CODE	Q'TY	DESCRIPTION	REMARKS
1	UL5073001	4	RUBBER FOOT	
2	UL5075001	1	BASE PLATE ASSY	
3	085411015	8	TAPTITE, BIND B M4X10	
4	087320616	1	TAPTITE, CUP S M3X6	
5	UL5269000	1	TOP COVER LINK	
6	UL5270001	1	WASHER	
7	085411015	1	TAPTITE, BIND B M4X10	
8	UL5082000	1	SWITCH LEVER	
9	UL5083001	2	SWITCH KEY	
10	UL5085000	1	PANEL RIGHT GUIDE	
11	UL5086003	1	CONCENTRATION DIAL, GRAY(1252)	
12	UL5088000	1	SOLENOID LEVER	
13	UL5090001	1	SOLENOID P ASSY	
14	UK2154001	1	REGIST SENSOR PCB ASSY P	
15	UK2206001	1	REGIST SENSOR HARNESS ASSY	
16	087310815	1	TAPTITE, CUP B M3X8	
17	085411015	3	TAPTITE, BIND B M4X10	
18	UF0245000	2	MINI CLAMP	
19	000400606	2	SCREW, PAN BIND M4X6	
20	UL5095000	1	DRIVER EARTH PLATE SPRING	
21	0A5401006	1	SCREW, PAN (WASHER) M4X10DB	
22	UL5094000	1	RUBBER BUSHING	

MODEL HL-XL 54U-101-015

3 . SCANNER

REF.NO.	CODE	Q'TY	DESCRIPTION	REMARKS
1	UL5535001	1	SCANNER UNIT (SP)	
2	085411015	4	TAPTITE, BIND B M4X10	
3	UL5134001	1	SPONGE	

MODEL HL-XL 54U-101-020

4 . PAPER FEEDER

REF.NO.	CODE	Q'TY	DESCRIPTION	REMARKS
1	UL5145001	1	UPPER SHOOT COVER ASSY	
2	UL5161000	1	RELEASE LINK	

MODEL HL-XL 54U-101-030

5 . PAPER TRAY

REF.NO.	CODE	Q'TY	DESCRIPTION	REMARKS
1	UL5542001	1	MP TRAY ASSY (SP)	
2	UL5738003	1	R-PAPER SETTING LABEL	

MODEL HL-XL 54U-101-040

6 . FIXING UNIT

REF.NO.	CODE	Q'TY	DESCRIPTION	REMARKS
1	UL5536001	1	FIXING UNIT, 115V (SP)	
1	UL5537001	1	FIXING UNIT, 230V (SP)	
2	UL5250001	1	PAPER EJECT ACTUATOR, BLACK	
3	087411216	2	TAPTITE, CUP B M4X12	
4	087320616	1	TAPTITE, CUP S M3X6	

MODEL HL-XL 54U-101-050

7 . CABINET

REF.NO.	CODE	Q'TY	DESCRIPTION	REMARKS
1	UL5267001	1	MAIN COVER, GRAY1227	
2	087411216	4	TAPTITE, CUP B M4X12	
3	UL5278001	1	FILTER COVER ASSY, GRAY1227	
4	UL5268001	1	TOP COVER, GRAY1227	
5	UL5271001	1	PAPER EJECT TRAY ASSY	
6	UL5277001	1	SET LABEL	
7	UH0905001	1	PATENT LABEL HL10	
8	UL5276001	1	MYLAR LABEL 630, US	
8	UL5481001	1	MYLAR LABEL 645, US	
8	UL5482001	1	MYLAR LABEL 655M, US	
8	UL5483001	1	MYLAR LABEL 645, CAN	
8	UL5484001	1	MYLAR LABEL 641, US	
8	UL5505001	1	MYLAR LABEL 650, US	
8	UL5516001	1	MYLAR LABEL 630, CAN	
8	UL5549001	1	MYLAR LABEL 641, CAN	
9	UL5064001	1	MODEL PLATE 630	
9	UL5065001	1	MODEL PALTE 631	
9	UL5066001	1	MODEL PLATE 641	
9	UL5067001	1	MODEL PLATE 645	
9	UL5068001	1	MODEL PLATE 650	
9	UL5069001	1	MODEL PLATE 655M	

MODEL HL-XL 54U-101-060

8 . MAIN PCB

REF.NO.	SYMBOL	CODE	Q'TY	DESCRIPTION	REMARKS
1	B48K151-300F	UK2609001	1	MAIN PCB ASSY (SP)	
1	B48K151-301D	UK2610001	1	MAIN PCB ASSY, 1M (SP)	
1	B48K151-304B	UK2611001	1	MAIN PCB ASSY, HEB (SP)	
1	B48K151-302D	UK2612001	1	MAIN PCB ASSY, DEMO 0.5M (SP)	
1	B48K151-303D	UK2613001	1	MAIN PCB ASSY, DEMO 1M (SP)	
2		UK2616000	1	MASK ROM:534200B	
2		UK2183000	1	EPROM 27C4000	
2		UK2617000	1	MASK ROM:TC538200AP	
3		UL5091000	2	PCB ANGLE	
4		087320616	4	TAPTITE, CUP S M3X6	
5		000400606	3	SCREW, PAN BIND M4X6	
6		UL5079001	1	I/F SHIELD ASSY	
7		UL5097000	1	I/F GROUND PLATE SPRING	

MODEL HL-XL 54U-101-101

9 . DRIVER PCB

REF.NO.	SYMBOL	CODE	Q'TY	DESCRIPTION	REMARKS
1	B48K152-300D	UK2614001	1	DRIVER PCB ASSY (SP)	

MODEL HL-XL 54U-101-151

10 . LOW POWER SUPPLY UNIT

REF.NO.	CODE	Q'TY	DESCRIPTION	REMARKS
1	UL5539001	1	PS PCB ASSY, 115V (SP)	
1	UL5540001	1	PS PCB ASSY, 230V (SP)	
2	UK2212001	1	LV HARNESS P ASSY	
3	UL8074001	1	HEATER HARNESS ASSY	

MODEL HL-XL 54U-101-200, 201

11 . HIGH POWER SUPPLY UNIT

REF.NO.	CODE	Q'TY	DESCRIPTION	REMARKS
1	UL5541001	1	HIGH-VOLTAGE PS ASSY (SP)	
2	UK2208001	1	HV HARNESS P ASSY	
3	UL8077001	1	GHG HARNESS ASSY	

MODEL HL-XL 54U-101-220

12 . POWER CORDS

REF.NO.	CODE	Q'TY	DESCRIPTION	REMARKS
1A	UL8078001	1	AC CORD ASSY, US-X	
1B	UK2118001	1	AC CORD ASSY, UK	
1C	UK2114001	1	AC CORD ASSY, EUR VDE	
1D	UK2135001	1	AC CORD ASSY, SAA	
1E	UK2116001	1	AC CORD ASSY, SEV	
1F	UK2146001	1	AC CORD ASSY, DEMKO	
1G	UK2137001	1	AC CORD ASSY, HEB	
1H	UK2602001	1	AC CORD ASSY, S.AF	
2	UL5407000	1	FILTER CLAMP	
3	085411015	1	TAPTITE, BIND B M4X10	
4	UL5408000	1	AC CORD CLAMP	
5	085411015	1	TAPTITE, BIND B M4X10	
6	0A5400605	1	SCREW, PAN (WASHER) M4X6	

MODEL HL-XL 54U-101-230

13 . ATTACHMENTS

REF.NO.	CODE	Q'TY	DESCRIPTION	REMARKS
1	UL5416001	1	PRINTER DRIVER DISK, HL-XL	
1	UL5485001	1	PRINTER DRIVER DISK, EU	
1	UL5487001	1	PRINTER DRIVER DISK, MAC	
2	UL5214000	1	TRAY EXTENSION	

MODEL HL-XL 54U-101-910

14 . DOCUMENTS

REF.NO.	CODE	Q'TY	DESCRIPTION	REMARKS
1	UL5422001	1	USER'S MANUAL, US	
1	UL5426001	1	USER'S MANUAL, GER	
1	UL5427001	1	USER'S MANUAL, FRA	
1	UL5428001	1	USER'S MANUAL, NOR	
1	UL5429001	1	USER'S MANUAL, NL	
2	UL5455001	1	SET GUIDE, US	
2	UL5456001	1	SET GUIDE, GER	
2	UL5457001	1	SET GUIDE, FRA	
2	UL5458001	1	SET GUIDE, NOR	
2	UL5459001	1	SET GUIDE, NL	
3	UL5460001	1	SOFT GUIDE US	
3	UL5461001	1	SOFT GUIDE GER	
3	UL5462001	1	SOFT GUIDE FRA	
3	UL5463001	1	SOFT GUIDE NOR	
3	UL5464001	1	SOFT GUIDE NL	
4	UL5532001	1	WARRANTY CARD, USA	
4	UD0373001	1	WARRANTY CARD, CAN	
4	UH1119001	1	WARRANTY CARD, FRA	
4	237703001	1	WARRANTY CARD, DUTCH	
5	UL5533001	1	SERVICE CARD 2, USA	
6	UH1392001	1	EPA INSERTION SHEET, USA	
7	UL5468001	1	DEMO INSTRUCTION SHEET, US	
8	UE0331001	1	BAG, 215X350H	
9	UL5550001	1	LICENSE SHEET,MAC	
10	UL5261001	1	ACCESSORY ORDER F	
11	UH1236001	1	CAUTION LABEL	

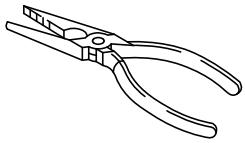
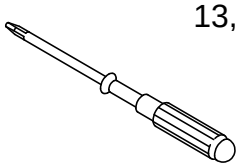
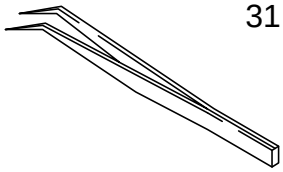
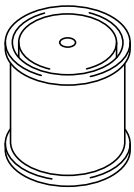
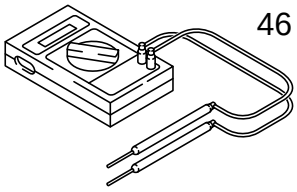
MODEL HL-XL 54U-101-920

15 . PACKING

REF.NO.	CODE	Q'TY	DESCRIPTION	REMARKS
1	UE0303001	1	CARTON, HL-630	
1	UE0304001	1	CARTON, HL-645	
1	UE0305001	1	CARTON, HL-655M	
1	UE0306001	1	CARTON, HL-630D	
1	UE0307001	1	CARTON, HL-645D	
1	UE0308001	1	CARTON, HL-655MD	
1	UE0309001	1	CARTON, HL-630EU	
1	UE0310001	1	CARTON, HL0631EU	
1	UE0311001	1	CARTON, HL-641	
1	UE0328001	1	CARTON, HL-641D	
1	UE0329001	1	CARTON, HL-650	
1	UE0330001	1	CARTON, HL-650D	
1	UE0375001	1	CARTON, HL-641CAN	
1	UE0398001	1	CARTON, HL-645CAN	
2	UE0280001	1	PAD ASSY, HL-6L	
3	UE0283000	1	CARTON, HL-6L DRUM	
4	UE0284000	1	CARTON, HL-6L MANUAL	
5	UE1070001	1	BAG, 700X800H	
6	UE0291001	1	BAG, 300X500H	
7	UE0292000	1	SHEET, 350X700	
8	UL5437001	1	BAR CODE LABEL, 56122US	
8	UL5438001	1	BAR CODE LABEL, 56123US	
8	UL5439001	1	BAR CODE LABEL, 56124US	
8	UL5440001	1	BAR CODE LABEL, 56131US	
8	UL5441001	1	BAR CODE LABEL, 56132US	
8	UL5442001	1	BAR CODE LABEL, 56133US	
8	UL5443001	1	BAR CODE LABEL, 56122EAN	
8	UL5444001	1	BAR CODE LABEL, 56123EAN	
8	UL5445001	1	BAR CODE LABEL, 56140US	
8	UL5508001	1	BAR CODE LABEL, 56137US	
8	UL5509001	1	BAR CODE LABEL, 56138US	
8	UL5510001	1	BAR CODE LABEL, 56139US	

MODEL HL-XL 54U-101-930

16. ADJUSTING TOOL KIT

1 	13,14 	31 
43-N 	46 	

TOOL NO.	TOOL NAME
ZX-1	PLIER (150MM)
ZX-13	SCREW DRIVER PHILIPS (NO.1)
ZX-14	SCREW DRIVER PHILIPS (NO.2)
ZX-31	TWEEZERS (150MM)
ZX-43-N	LUBLICATION GREASE (MOLYKOTE EM30L)
ZX-46	CIRCUIT TESTER

September '94
54U001NE0-HL660
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LASER PRINTER

SERVICE MANUAL

MECHANICS & ELECTRONICS

PREFACE

This service manual contains basic information required for after-sales service of the laser printer (here-in-after referred to as "this machine" or "the printer"). This information is vital to the service technical in maintaining the high printing quality and performance of the printer.

This service manual covers both HL-630 / HL-631/ HL-641,645 / 650 / 655M.

This manual consists of the following chapters:

CHAPTER I : FEATURES AND SPECIFICATIONS

Features, specifications, and operation.

CHAPTER II : THEORY OF OPERATION

Basic operation of the mechanical system, the electrical system and the electrical circuit, and their timing.

CHAPTER III : DISASSEMBLY AND REASSEMBLY

Procedures of disassembling and reassembling the mechanical system.

CHAPTER IV : TROUBLESHOOTING

Reference values and adjustment, troubleshooting for image defects, troubleshooting for malfunctions, etc.

Information in this manual is subject to change due to improvement or re-design of the product. All relevant information in such cases will be supplied in service information bulletins (Technical Information).

A through understanding of this printer, based on information on this service manual and service information bulletins, is required for maintaining its quality performance and fostering the practical ability to find the cause of troubles.

CONTENTS

CHAPTER I FEATURES AND SPECIFICATIONS

1 FEATURES I-1

2 SPECIFICATIONS I-2

2.1 Printing I-2
2.2 Functions I-2
2.3 Electrical and Mechanical I-2
2.4 Paper Specification I-4
2.5 Print Delivery I-4
2.6 Paper I-4
2.7 Effective Printing Area I-5

3 SAFETY INFORMATION I-7

3.1 Laser Safty (110 - 120V Model only) I-7
3.2 CDRH Regulations (110 - 120V Model only) I-7
3.3 Caution for Laser Product I-8

CHAPTER II THEORY OF OPERATION

1 ELECTRONICS II-1

1.1 General Block Diagram II-1
1.2 Main PCB Block Diagram II-2
1.3 Main PCB II-3
1.3.1 CPU II-3
1.3.2 ASIC II-4
1.3.3 ROM II-7
1.3.4 RAM II-7
1.3.5 Optional RAMs II-8
1.3.6 Optional Serial I/O II-8
1.3.7 EFPROM II-9
1.3.8 Reset Circuit II-9
1.3.9 CDCC I/O II-9
1.3.10 Engine I/O II-10
1.4 Driver PCB II-11
1.4.1 Paper Feed Motor Drive Circuit II-11
1.4.2 Solenoid (Pick-up,Clutch), Erase Lamp, Fan Motor Drive Circuit II-11
1.4.3 Operation Panel II-12
1.4.4 Scanner Motor, Laser Sensors(Registration, Paper Eject, Toner), Thermistor, High-voltage Power Supply II-12
1.5 Power Supply II-13

2 MECHANICS II-14

2.1 Overview of printing mechanism II-14
2.2 Paper Transfer II-15
2.2.1 Paper Supply II-15
2.2.2 Paper Registration II-15
2.2.3 Paper Eject II-16
2.3 Sensors II-17
2.3.1 Multi Purpose Tray (MPT) Sensor II-17
2.3.2 Cover Sensor II-17
2.3.3 Toner Empty Sensor II-17
2.4 Process Unit II-18
2.4.1 Photosensitive Drum II-18
2.4.2 Primary Charger II-18
2.4.3 Developer Roller II-18
2.4.4 Transfer Roller II-18
2.4.5 Cleaner Blade II-18

2.4.6 Toner Auger II-18
2.4.7 Erase Lamp II-18
2.5 Print Process II-18
2.5.1 Charging II-18
2.5.2 Exposure Stage II-19
2.5.3 Developing II-20
2.5.4 Transfer II-20
2.5.5 Drum Cleaning Stage II-21
2.5.6 Erasing Stage II-21

CHAPTER III DISASSEMBLY AND REASSEMBLY

1 SAFETY PRECAUTIONS III-1
2 DISASSEMBLING FLOW III-2
3 DISASSEMBLING PROCEDURE III-3
3.1 Multi-purpose Paper Tray III-3
3.2 Process Unit III-3
3.3 Top Cover III-4
3.4 Main Cover III-5
3.5 Upper Shoot Cover III-6
3.6 Fixing Unit III-6
3.7 Scanner Unit III-7
3.8 Fan Guard III-7
3.9 Interlock Levers III-8
3.10 Fan Motor III-8
3.11 Registration Sensor PCB III-8
3.12 Solenoid P III-9
3.13 Gear Shaft Plate III-9
3.14 Gears III-10
3.15 Main Motor Unit III-11
3.16 Solenoid C III-11
3.17 Main PCB III-12
3.18 Base Plate III-12
3.19 Driver PCB III-14
3.20 Power Supply PCB III-14
3.21 High-voltage Power Supply III-15
3.22 Tray Extention III-15
3.23 Paper Eject Tray III-16
3.24 Filter Cover III-16
4 PACKING III-17

CHAPTER IV TROUBLE SHOOTING

1 INTRODUCTION IV-1
1.1 Initial check IV-1
1.2 Basic Procedure IV-2
2 IMAGE DEFECTS IV-3
2.1 Image Defect Example IV-3
2.2 Troubleshooting Image Defect IV-4
3 TROUBLESHOOTING OF MALFUNCTIONS IV-12
4 INSPECTION MODE IV-17
4.1 Inspection mode 1 ..... IV-17
4.2 Inspection Pattern 1 ..... IV-17
4.3 Inspection mode 2 ..... IV-19
4.4 Initialization of NV-RAM IV-19
4.5 Error codes IV-20

CHAPTER I FEATURES AND SPECIFICATIONS

1 FEATURES

This printer has the following features:

300dpi Resolution and 6ppm Printing Speed

300 dots per inch (dpi) with microfine toner and six pages per minute (ppm) printing speed (Letter paper).

Versatile Paper Handing

The printer has a multi-purpose sheet feeder and straight paper path mechanism. Using this mechanism, you can load A4, letter, legal, B5, A5 and executive size of paper, and various types of paper including envelopes, postcard, organizer paper, and your custom paper size. The multi-purpose sheet feeder also allows manual paper loading, so you can also use labels.

Remote Printer Console Program for DOS

The utility program, Remote Printer Console, is available on the floppy disk supplied with your printer. When you operate your computer in the DOS (Disk Operating System) environment, this allows you to easily change the default setting of the printer such as fonts, page setup, emulations and so on. This program also provides a status monitor program, which is a Terminate-and-Stay Resident (TSR) program. It can monitor the printer status while running in the background and report the current status or errors on your computer screen.

Popular Printer Emulation Support

This printer supports three printer emulation modes, HP LaserJet IIP, Epson FX-850, and IBM Proprinter XL. When you use DOS application software or Windows™ version 3.0 or earlier, you can use any of these emulations to operate the printer. The printer also supports Auto-emulation switching between HP and Epson or HP and IBM. If you want to fix the printer emulation, you can do it using the Remote Printer Console Program.

Bi-Directional Parallel Interface

The parallel interface of this printer allows bi-directional communication with a computer. This interface allows the printer to communicate back to the computer useful information such as the amount of memory installed, and other printer setup conditions. As the supplied Remote Printer Console program or Windows™ 3.1 driver supports the bi-directional mode, they can both report the printer status.

Optional Macintosh Interface (Standard in some countries)

The optional Macintosh serial interface kit is available with a driver, which allows your printer to be connected to Macintosh computers. With this option, you can use your printer with both an IBM PC, or its clone, and a Macintosh at the same time. This optional interface board can be used as a RS-422A interface for Macintosh or a RS-232C serial interface for IBM PC or compatible.

Enhanced Memory Management

The printer has it's own data Compression Technology, which can automatically compress graphic data and downloaded font data efficiently into the printer memory . You can avoid memory errors and print most fullpage 300 dpi graphic and text data, including large fonts, with printer's standard memory.

2 SPECIFICATIONS

2.1 Printing

Print Method	Electrophotography by semiconductor laser beam scanning
Resolution	300 dots/inch
Print Speed	6 page/minute (when loading Letter-size paper from the multi-purpose sheet feeder)
Warm-Up	Max. 1 minute at 23°C (73.4°F)
First Print	20 seconds (when loading Letter-size paper from the multi-purpose sheet feeder)
Print Media	Toner in a cartridge Life Expectancy: 3,000 pages/cartridge (when printing A4 or letter -size paper at 4% print coverage)
Developer	Drum unit, separated from toner cartridge (when printing A4 or letter -size paper at 4% print coverage in continuous printing.)
Download Fonts	Acceptable
True Type Fonts on disks	True Type™-compatible soft-fonts for Windows™ on supplied disk

2.2 Functions

CPU	MC68EC000 16 MHz
Emulation	Automatic emulation selection among HP LaserJet IIP, EPSON FX-850, and IBM Proprinter XL
Printer Driver	Windows™ 3.1 driver, supporting Brother Native Compression mode and bi-directional capability. Optional Macintosh® QuickDraw driver (Standard in some countries.)
Interface	Bi-directional Centronics parallel. RS-422A/RS-232C serial interface is optionally available. (The serial interface is a standard in some countries.)
Memory	1.0 or 2.0 MB (subject to the printer model) with Data Compression Technology. Expandable up to 2.0 MB with the optional memory board.
Control Panel	2 switches and 4 lamps
Diagnostics	Self-diagnostic program

2.3 Electrical and Mechanical

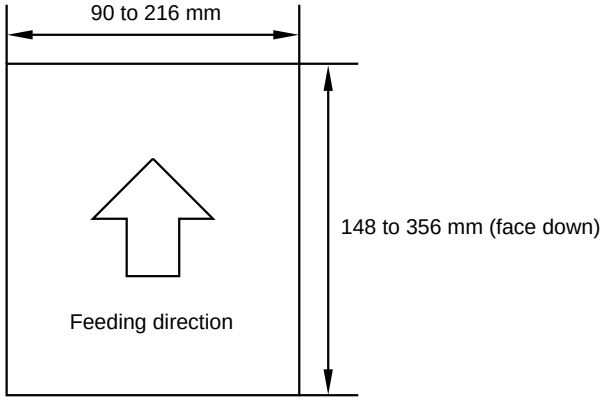
Power Source	U.S.A. and Canada :	AC 110 to 120 V, 60Hz
	Europe and Australia:	AC 220 to 240 V, 50Hz
Power Consumption	Printing:	480 W or less
	Standing by:	60 W or less
	Sleep:	10 W or less
Noise	Printing:	50 dB A or less
	Standing by:	38 dB A or less

Temperature	Operating:	10 to 32.5°C (59 to 90.5°F)
	Storage:	0 to 40° C (38 to 104°F)
Humidity	Operating:	20 to 80% (without condensation)
	Storage:	20 to 80% (without condensation)
Dimensions (W x H x D)	357(W) 351(D) 192(H) mm (when the output tray is closed and the Multi-purpose sheet	

2.4 Paper Specification

(1) Multi-purpose tray loading

Paper size: A4, Letter, Legal, B5, A5, and Executive, and other sizes of paper that can be handled by the feed mechanism, can be loaded.



Feedable paper type	:	60 (16 lb.) to 135 (36 lb.)g/m2
Maximum load height	:	22 mm (200 sheets of 75 g/m^2 paper) letter size
Envelopes	:	10 envelopes
Setting method	:	Pull the manual paper tray toward you, insert the sheaf of paper into the tray, alining the top edge of the sheets, then push the tray back to its original position.

(2) Manual paper loading

The manual paper loading takes priority of feeding and a single sheet of paper can be fed into the printer.
The applicable sizes and types of paper are the same as the multi-purpose tray loading above in specification.

2.5 Print delivery

(1) At the print delivery tray opened

Tray capacity : Maximum 100 sheets (75g/m^2), face-down only

(2) At the print delivery tray closed

Tray capacity : 1 sheet (75 g/m^2), face-down only

Note) Face down : Deliver the printed face of the paper downward.
Environment : 23°C

2.6 Paper

(1) Types of paper

(a) Normal paper (60 to 135 g/m^2, specified types of high-quality paper)

- A4 size
- Letter size
- Legal size
- B5 size
- A5 size
- Executive size

* The specified types of plain paper are as follows:
Letter : Xerox 4024 (75 g/m^2)
A4 : Mitsubishi PPC paper (64 g/m^2), Multi Copy (80 g/m^2)

(b) Special paper (specified types)

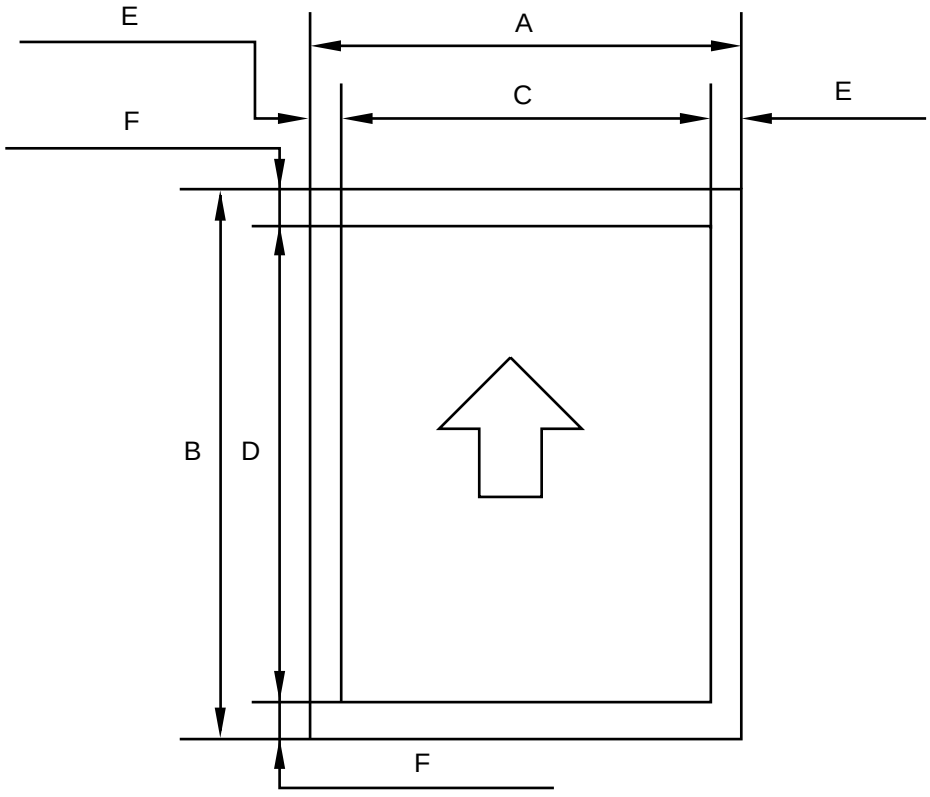
- Labels
- Envelopes (DL, C5, COM10)
- Postcards
- Organizers (K, L, and M sizes of DAY-TIMERS)

(2) Paper feed conditions

Type	Name	Tray feed	Manual feed
Normal paper (cut sheet)	60 to 135 g/m^2 paper	○	○
Special paper (cut sheet)	Labels		○
	Envelopes	○	○
	Postcards	○	○
	Organizers	○	○

2.7 Effective printing area

Printable area



The effective printing area means the area within which the printing of all the data received without any omissions can be guaranteed.

The table below shows the effective printing areas.

SIZE	A	B	C	D	E	F
A 4	210.0mm (2,480 dots)	297.0mm (3,507 dots)	203.2.0mm (2,400 dots)	288.5mm 11.36" (3,408 dots)	3.4mm (40 dots)	4.23mm (50 dots)
Letter	215.9mm 8.5" (2,550 dots)	279.4mm 11.0" (3,300 dots)	207.5mm 8.0" (2,400 dots)	288.5mm 10.67" (3,200 dots)	6.35mm (75 dots)	↑
Legal	215.9mm 8.5" (2,550 dots)	355.6mm 14.0" (4,200 dots)	207.5mm 8.0" (2,400 dots)	288.5mm 10.67" (3,200 dots)	↑	↑
B 5	182.0 mm	257.0 mm	173.5 mm	248.5 mm	6.01mm (71 dots)	↑
Executive	184.15mm 7.25" (2,175 dots)	266.7mm 10.5" (3,150 dots)	175.7mm 6.92" (2,400 dots)	258.2mm 10.17" (3,200 dots)	6.35mm (75 dots)	↑
A 5	148.5mm (1,754 dots)	105.0mm (1,240 dots)	(1,654 dots)	(1,140 dots)	↑	↑
Organizer (K size)	95.25mm 3.75" (1,125 dots)	171.45mm 6.75" (2,025 dots)	86.78mm 3.42" (1,025 dots)	162.98mm 6.42" (1,925 dots)	↑	↑
Organizer (L size)	139.7mm 5.5" (1,650 dots)	215.9mm 8.5" (2,550 dots)	131.23mm 5.17" (1,550 dots)	207.43mm 8.17" (2,450 dots)	↑	↑
COM-10	104.78mm 4.125" (1,237 dots)	241.3mm 9.5" (2,850 dots)			↑	↑
MONARCH	98.43mm 3.875" (1,162 dots)	190.5mm 7.5" (2,250 dots)			↑	↑
C 5	162mm (1,913 dots)	229mm (2,704 dots)			6.01mm (71 dots)	↑
DL	110mm (1,299 dots)	220mm (2,598 dots)			↑	↑

(Note that the paper sizes indicated here should conform to the nominal dimensions specified by JIS.)
A4 paper must accommodate 80 characters printed in pica pitch (203.2 mm).

	feeder is removed.)
Weight	Approx. 7kg (15.4 lb.)

3 SAFETY INFORMATION

3.1 Laser Safety (110 - 120V Model only)

This printer is certified as a Class 1 laser product under the US Department of Health and Human Services (DHHS) Radiation Performance Standard according to the Radiation Control for Health and Safety Act of 1968. This means that the printer dose not produce hazardous laser radiation.

Since radiation emitted inside the printer is completely confined within the protective housings and external covers, the laser beam cannot escape from the machine during any phase of user operation.

3.2 CDRH Regulations (110 -120 V Model only)

The Center for Device and Radiological Health (CDRH) of the US Food and Drug Administration implemented regulations for laser products on August 2, 1976. These regulations apply to laser products manufactured from August 1, 1976. Compliance is mandatory for products marketed in the United States. The label shown below indicates compliance with the CDRH regulations and must be attached to laser products marketed in the United States.

MANUFACTURED : K
BROTHER INDUSTRIES, LTD.
15-1, Naeshiro-cho, Mizuho-ku Nagoya 467, Japan.
This product conforms with CDRH radiation
performance standard 21 CFR chapter 1
subchapter J.

Fig. 1.1

3.3 Caution for Laser Product

(1) CAUTION: When the machine during serving is operated with open cover, the regulations of VBG 93 and the performance instructions for VBG 93 are valid.

(2) CAUTION: In case of any trouble with the laser unit, please replace the laser unit itself. To prevent direct exposure to the laser beam, do not try to open the enclosure of laser unit.

(3) Location of the Exit Opening of Laser Beam.

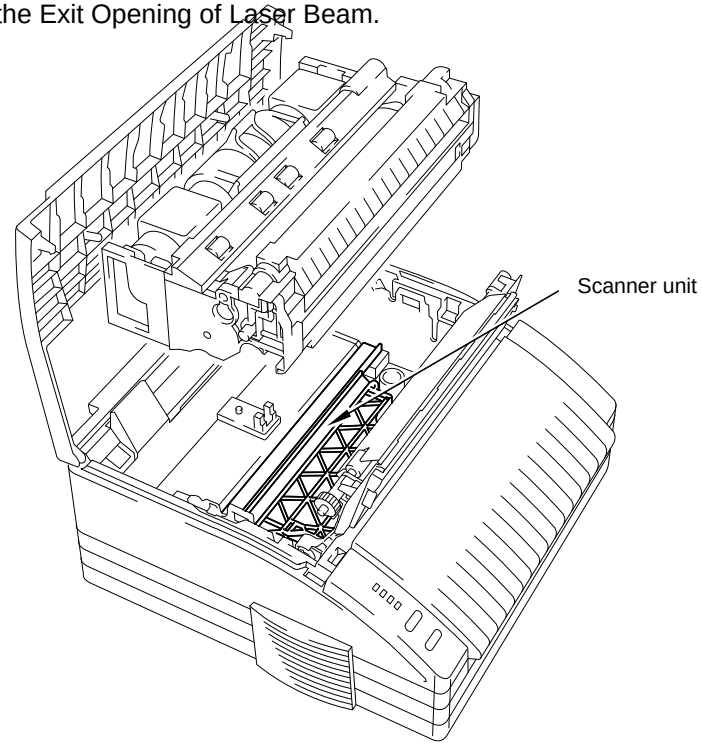


Fig. 1.2

(4) Location of Caution Label for Laser Product.

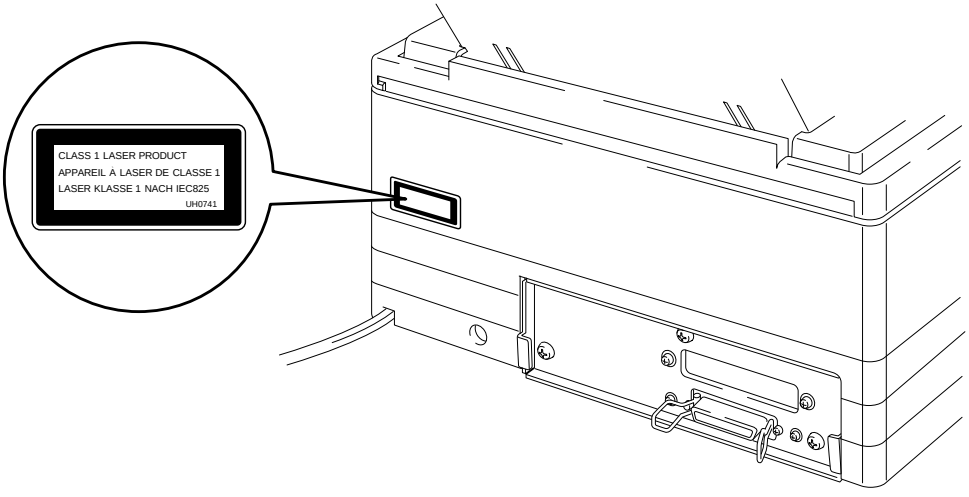


Fig. 1.3

CHAPTER II THEORY OF OPERATION

1. ELECTRONICS

1.1 General Block Diagram

Fig. 2.1 shows a general block diagram of this printer.

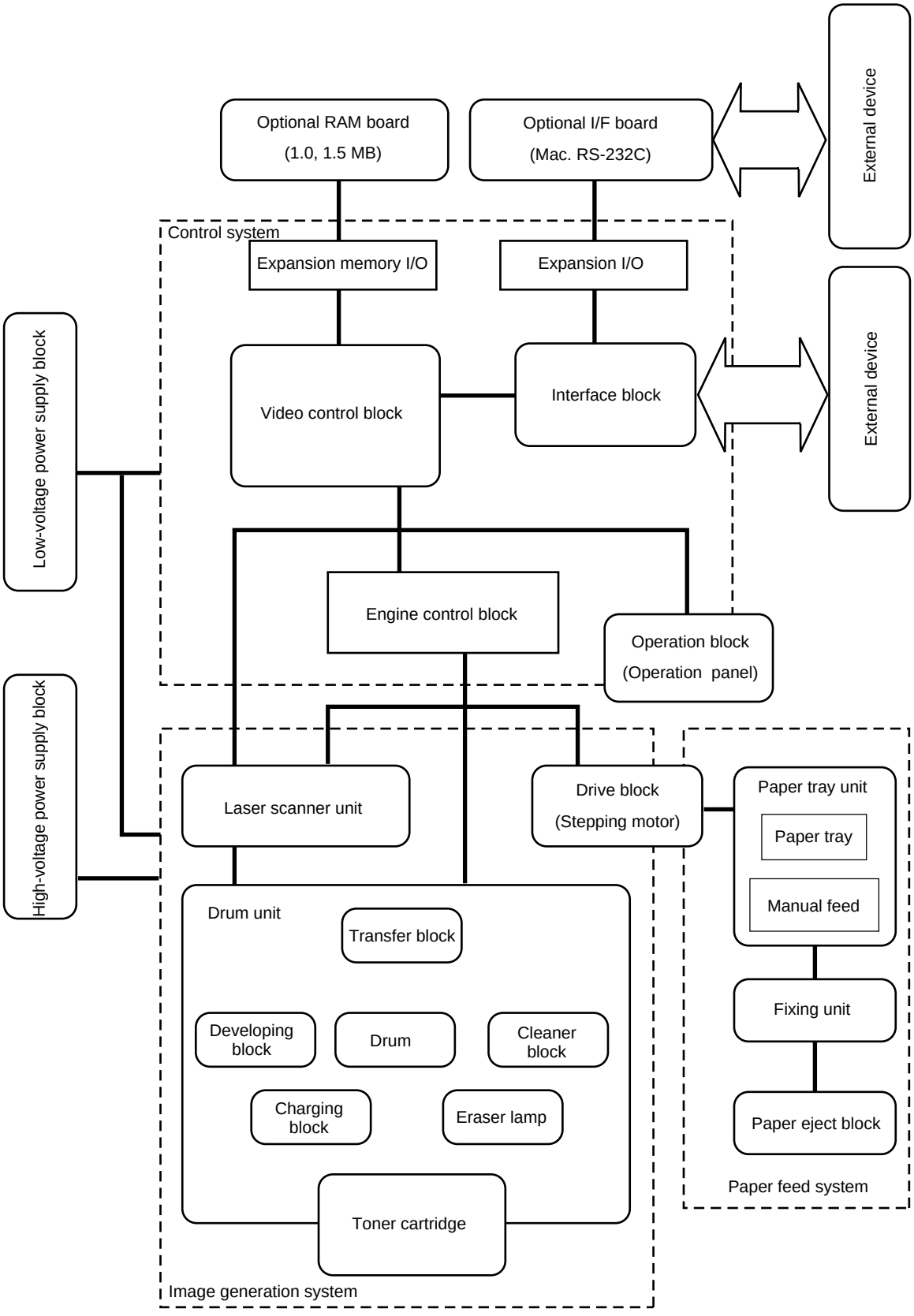


Fig. 2.1 General Block Diagram

1.2 Main PCB Block Diagram

Fig. 2.2 shows a block diagram of the main PCB.

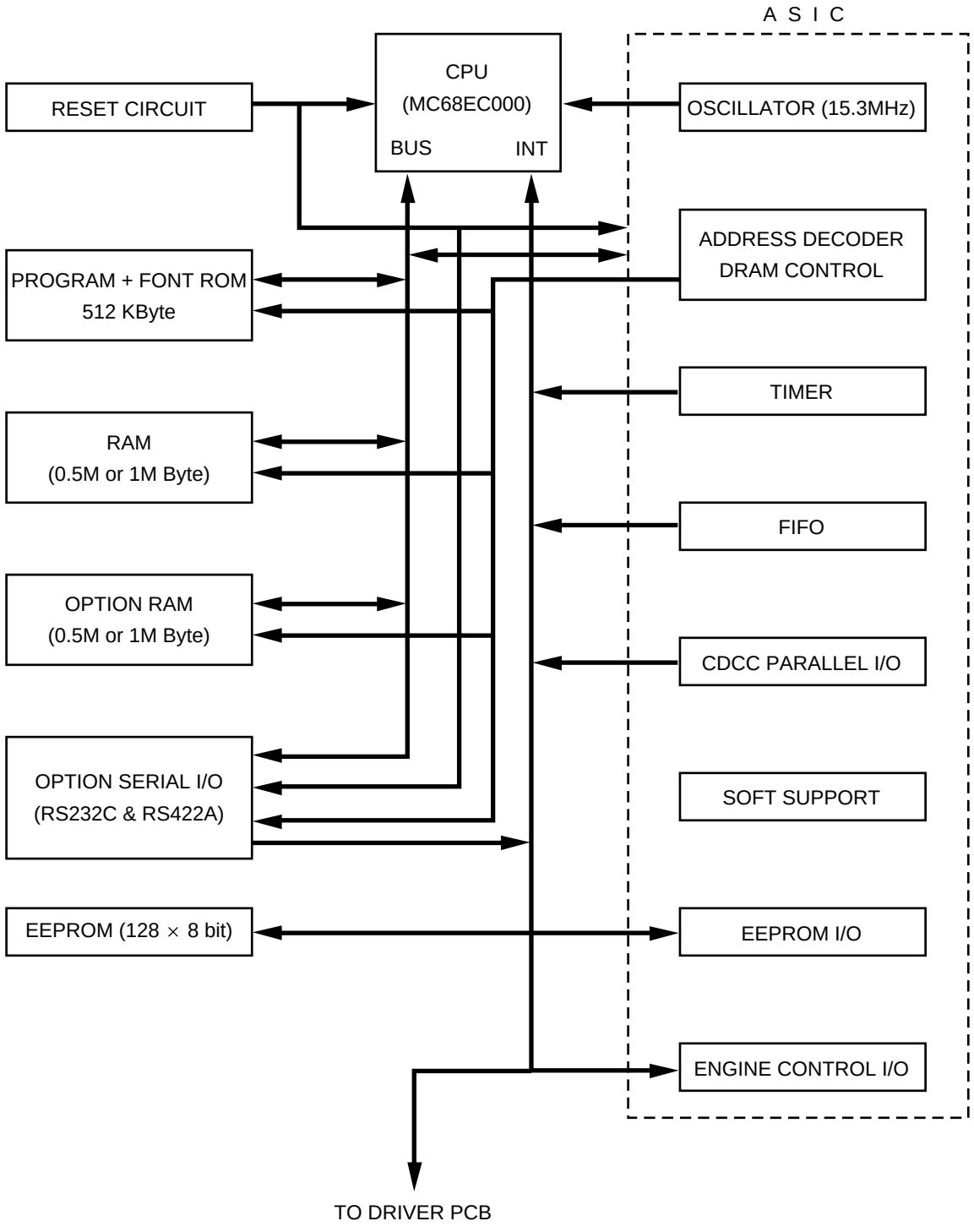


Fig. 2.2 Main PCB Block Diagram

1.3 Main PCB

1.3.1 CPU

The CPU is a Motorola MC68EC000FN16 which is driven with a clock frequency of 15.3 MHz. This clock frequency is made by dividing the source clock of 30.67 MHz into two. The address bus is 23 bits of A1 to A23, and the data bus is 16 bits. The total memory space is 16 MBytes.

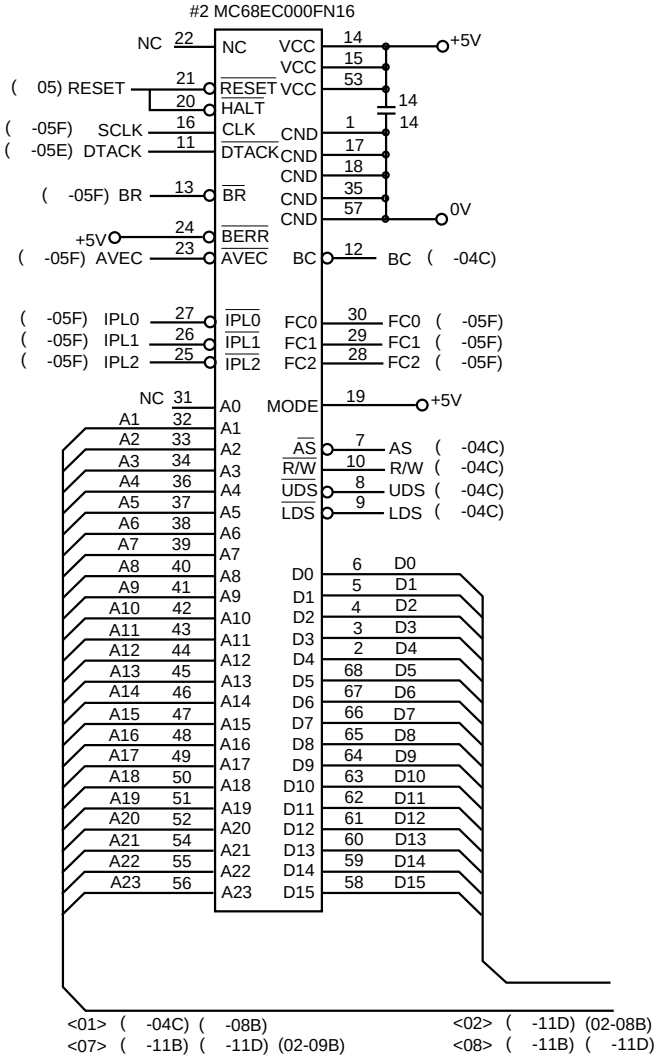


Fig. 2.3

1.3.2 ASIC

(1) Oscillator circuit
Generates the main clock for the CPU by deviding the source clock frequency into two.

(2) Address decoder
Generates the CS for each device.

(3) DRAM control
Generates the RAS, CAS, WR, OE and MA signals for the DRAM and controls refresh processing (CAS before RAS self-refreshing method).

(4) Interrupt control
Interrupt levels:

Priority High	7	NMI
	6	FIFO
	5	Timer1
	4	BD
	3	EXINT (Option Serial I/O)
	2	CDCC
Low	1	Timer2

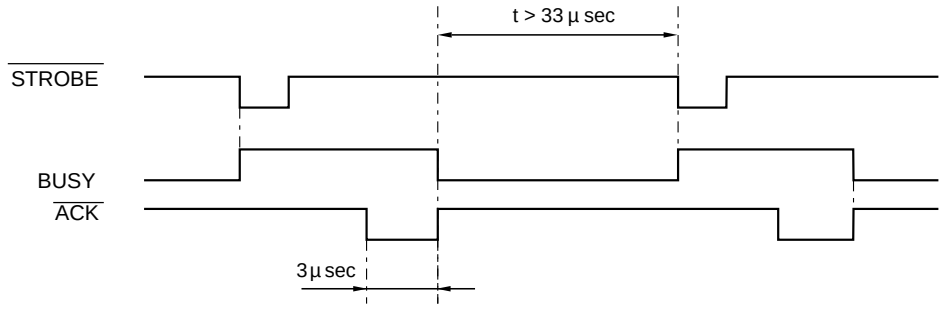
(5) Timers
The following timers are incorporated:

Timer 1	16-bit timer
Timer 2	10-bit timer
Timer 3	Watch-dog timer 1
Timer 4	Watch-dog timer 2

(6) FIFO
A 2,560-bit FIFO is incorporated. Data for one raster is transfered from the RAM to the FIFO by DMA transmission and is out put as serial video data. The data cycle is 1.53 MHz.

(7) CDCC parallel I/O
CDCC data is received in 4-byte units by DMA transmission. If data of less than 4 bytes remains, a time-out occurs and it is forcibly transferred by DMS transfer.

Low Speed Mode



High Speed Mode

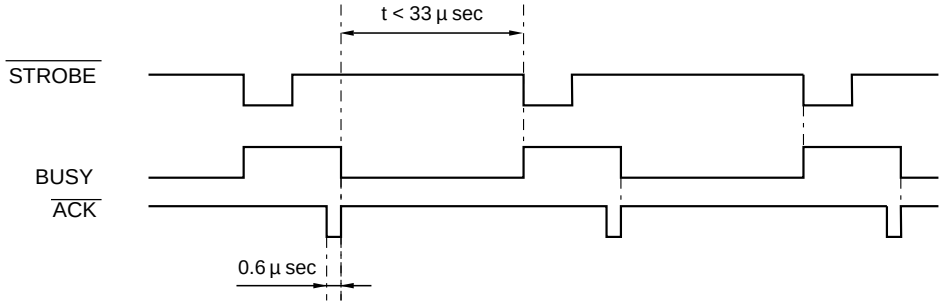


Fig. 2.4

The default setting is "AUTO MODE", which means that the time between the falling edge of the BUSY signal and the rising edge of the STROBE signal is measured, and if it is longer than about 33 μ sec, the mode is automatically switched to the LOW SPEED MODE; if it is shorter, the mode is automatically switched to the HIGH SPEED MODE.

It is also possible to fix the mode to the LOW SPEED MODE by sending a command from the PC to rewrite the contents of the NV-RAM.

BUSY goes HIGH at the falling edge of STROBE.

The data (8-bit) from the PC is latched in the ASIC at the rising edge of STROBE.

The pulse width of ACK differs according to the MODE, as shown above.

(8) Software support
Supports 16 x 16 rotation, bit expansion, and floating decimal point calculations.

(9) EEPROM I/O
One output port and one I/O port are assigned.

(10) Engine control I/O

This I/O is for connection to the driver PCB. It controls the motors, solenoids, sensors, etc.

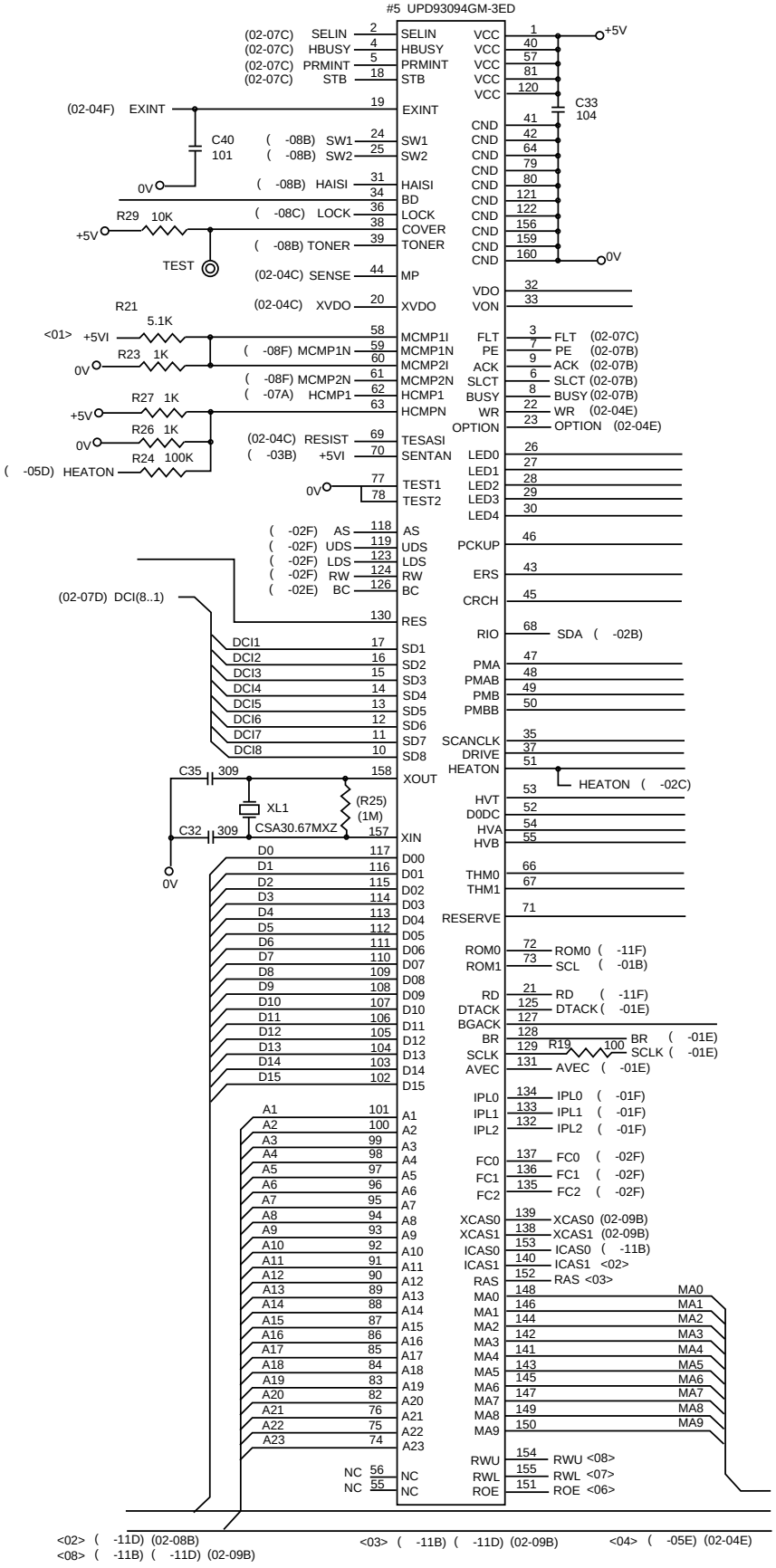


Fig. 2.5

1.3.3 ROM

A program of 512 Kbytes and the font data are stored in the ROM.
A 42-pin IC socket is provided: an 8 Mbit ROM (42-pin) can be mounted to this socket normally, but a 4 Mbit ROM (40-pin) must be mounted to leave the 1st and 42nd pins of the socket opened.

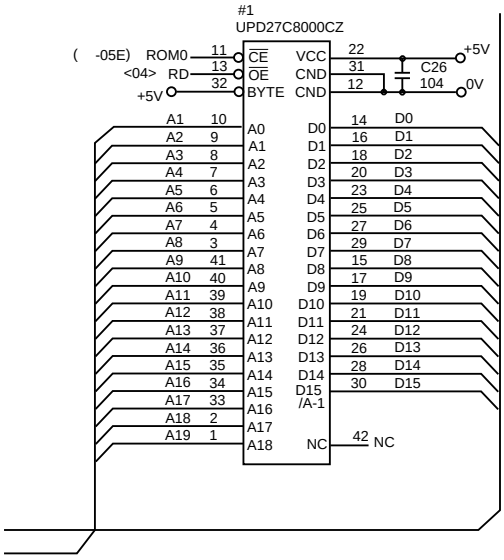


Fig. 2.6

1.3.4 RAM

A 4-Mbit DRAM (x 16 bits) is used as the RAM. Depending on the specification, There are two models: the 0.5 M model (one mounted), or the 1 M model (two mounted).

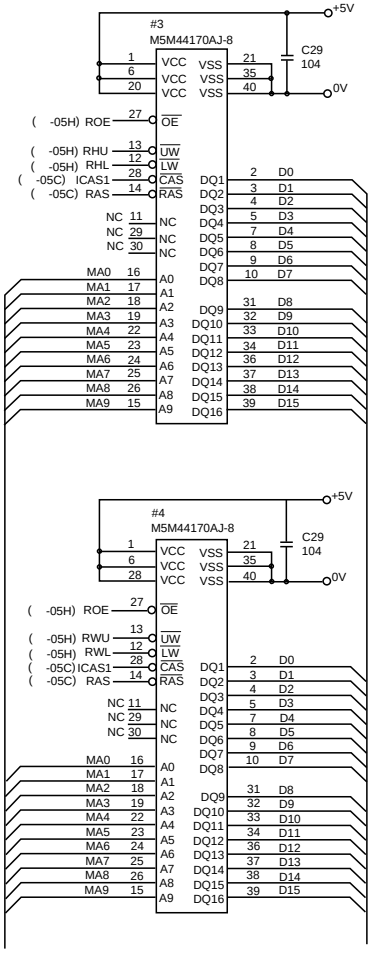


Fig. 2.7

1.3.5 Optional RAMs

There are two types of optional RAM: the 1 Mbyte model and the 1.5 Mbyte model, but even if the 1.5 Mbyte model is mounted in addition to a 1 M mode, only 2 Mbytes in total will be recognized.

0.5 M model + 1 M optional RAM ⇒ 1.5 Mbytes
0.5 M model + 1.5 M optional RAM ⇒ 2 Mbytes
1 M model + 1 M optional RAM ⇒ 2 Mbytes
1 M model + 1.5 M optional RAM ⇒ 2 Mbytes

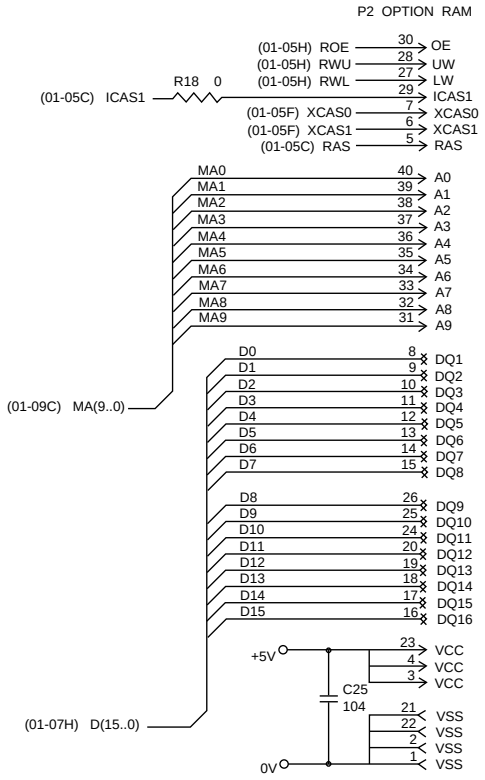


Fig. 2.8

1.3.6 Optional Serial I/O

The interrupt of serial I/O are input to the EXINT terminal of the ASIC, and are recognized by the CPU. A 32-byte space for register is provided for this I/O, which are read and written to by the CPU.

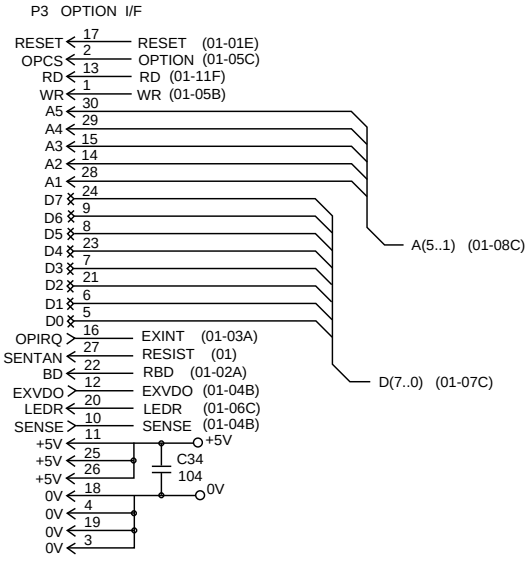


Fig. 2.9

1.3.7 EEPROM

The EEPROM is X24CO1A type of a two-wire method with a 128 x 8 bit configuration.

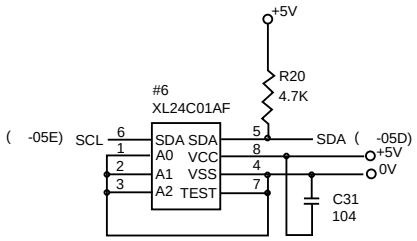


Fig. 2.10

1.3.8 Reset circuit

The reset IC is PST593DMT.
The reset voltage is 4.2 V (typ.) and the LOW period of reset is 200 ms (typ.).

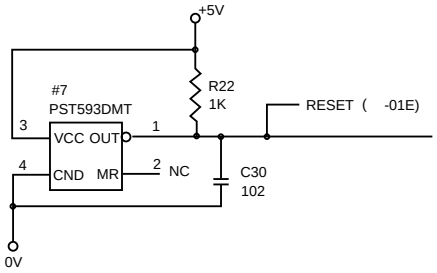


Fig. 2.11

1.3.9 CDCC I/O

Fig. 2.12 shows the CDCC interface circuit.

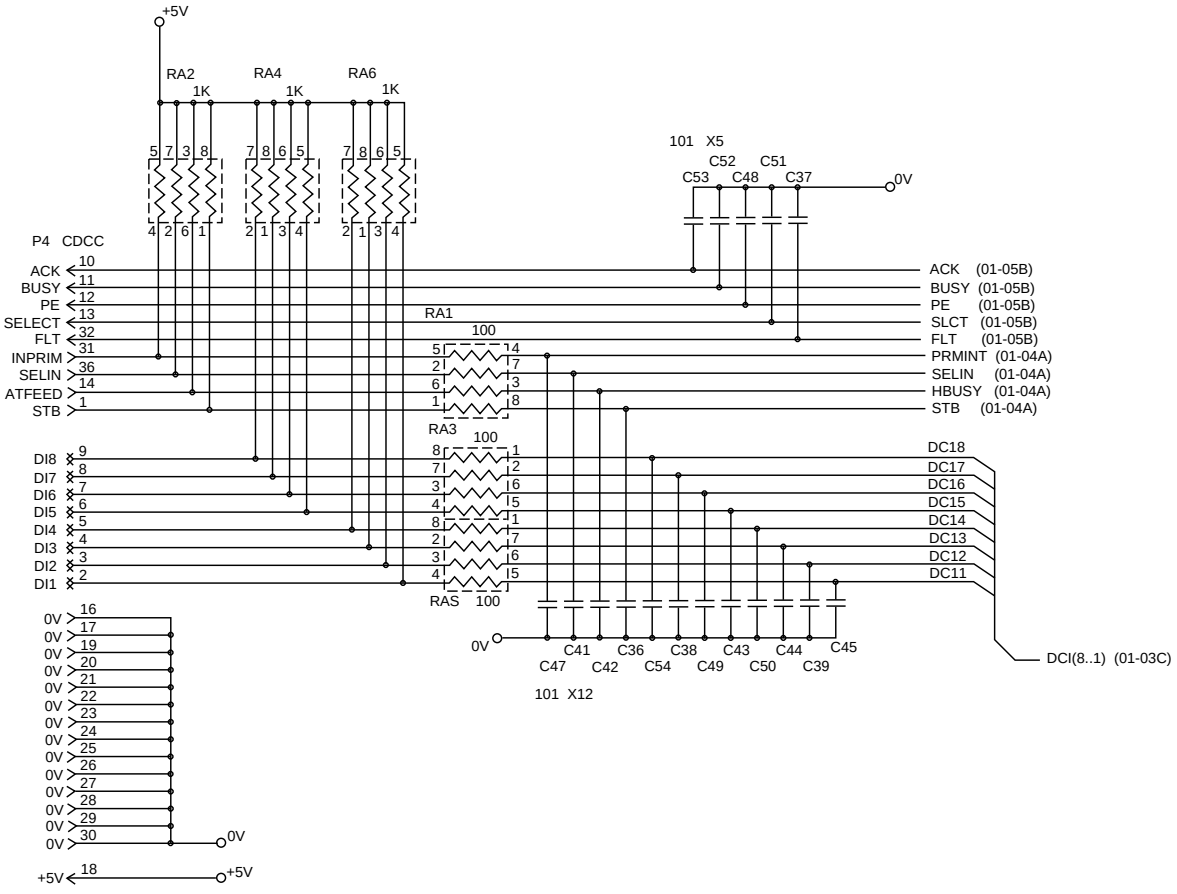


Fig. 2.12

1.3.10 Engine I/O

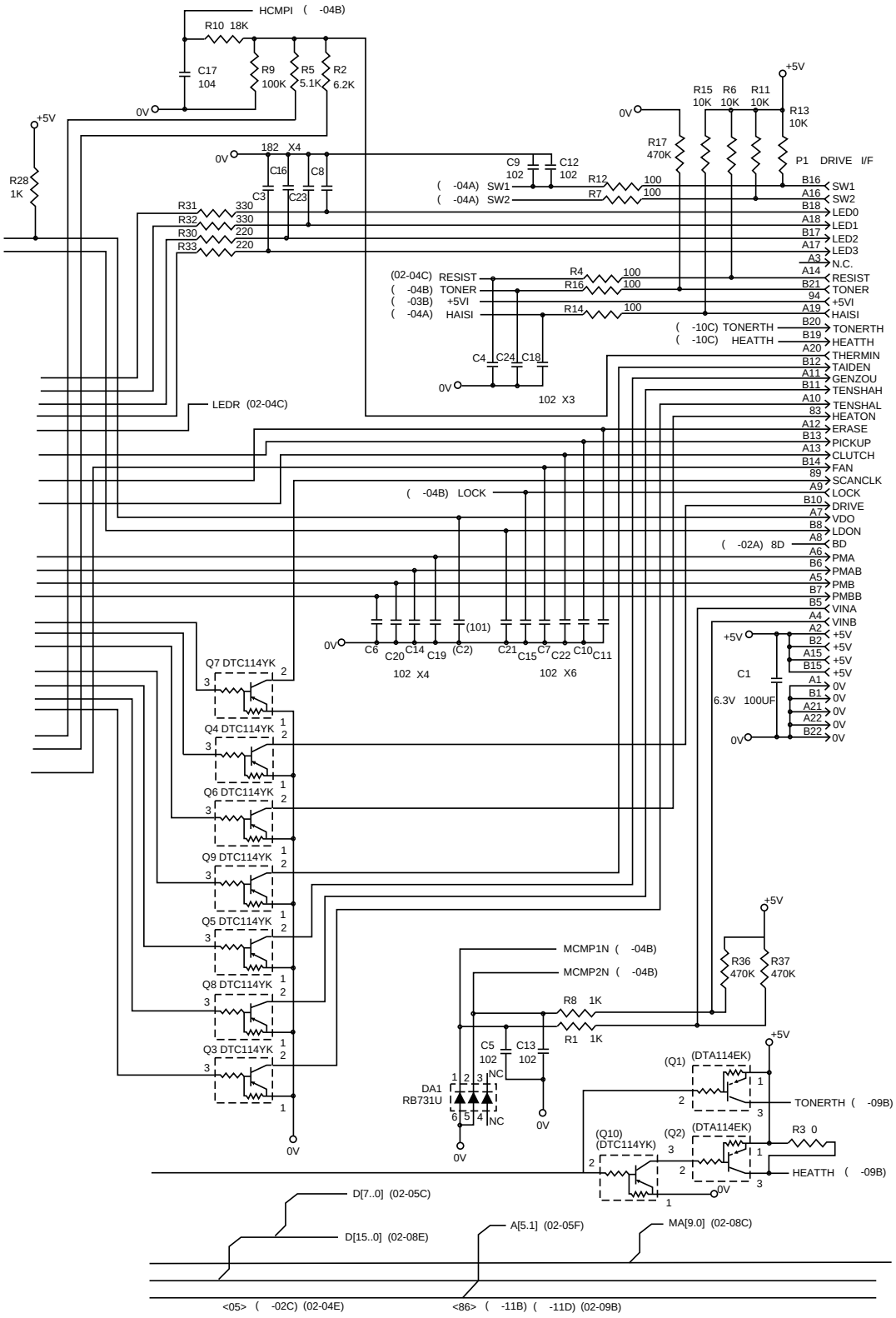


Fig. 2.13

1.4 Driver PCB

1.4.1 Paper Feed Motor Drive Circuit

The motor driver is a four-device FET array, which manage the constant current control by feeding back the voltage of the current detection resistor. The comparator for the constant current control is incorporated in the AS IC on the main PCB, which controls the excited output to go OFF by the specified period (12.5µs) when the motor drive current exceeds the specified current level. The excitation method is 2-2 phase excitation with an unipolar drive.

The four diodes D1NL2OU and Zener diode are the circuit that protects against overvoltage due to counter-electromotive force.

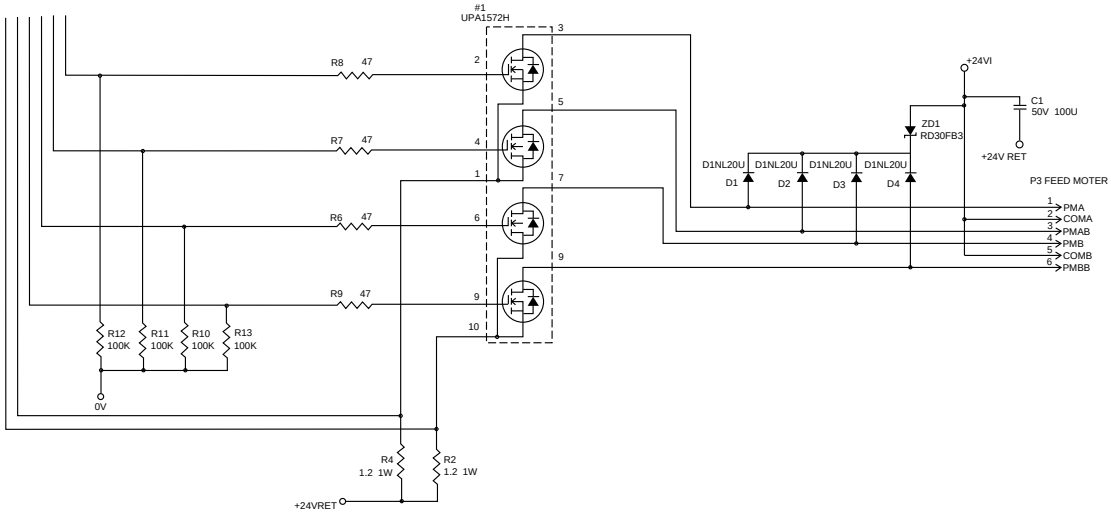


Fig. 2.14

1.4.2 Solenoid (Pick-up, Clutch), Erase Lamp, Fan Motor Drive Circuit

A darlington transistor (2SC5060) is used for these circuit.

A flywheel diode D1NL20U is provided for the fan motor drive circuit to prevent counter-electromotive force.

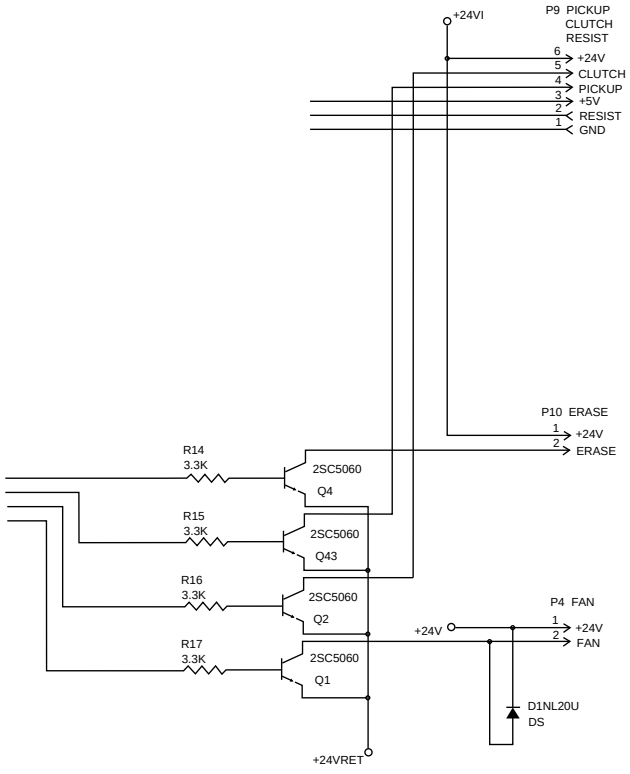


Fig. 2.15

1.4.3 Operation Panel

Four LEDS and two switches are mounted on the PCB.

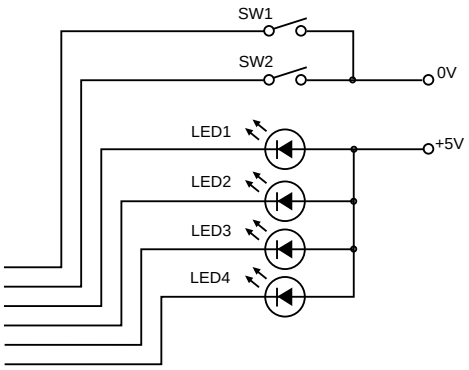


Fig. 2.16

1.4.4 Scanner Motor, Laser, Sensors (Registration, Paper Eject, Toner), Thermistor, High-voltage Power Supply.

Since these are controlled directly from the main PCB, the driver PCB has only relays the above signals of each connectors.

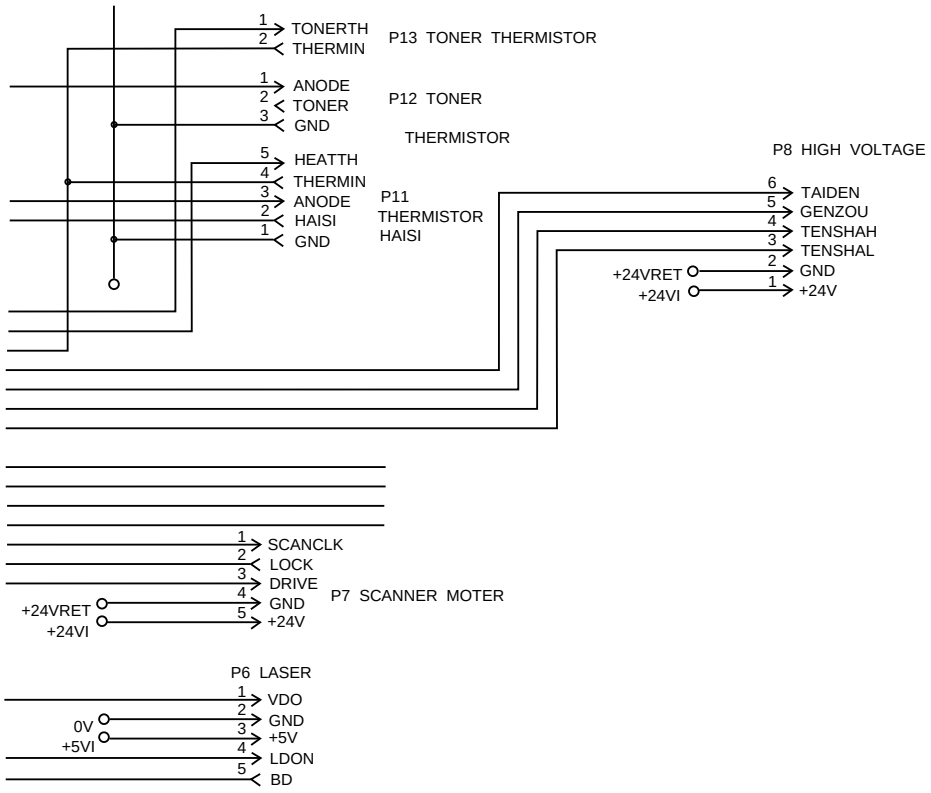


Fig. 2.17

1.5 Power Supply

The power supply uses the switching regulation system to generate the regulated DC power (+5V and +24V), which are converted from the AC line.

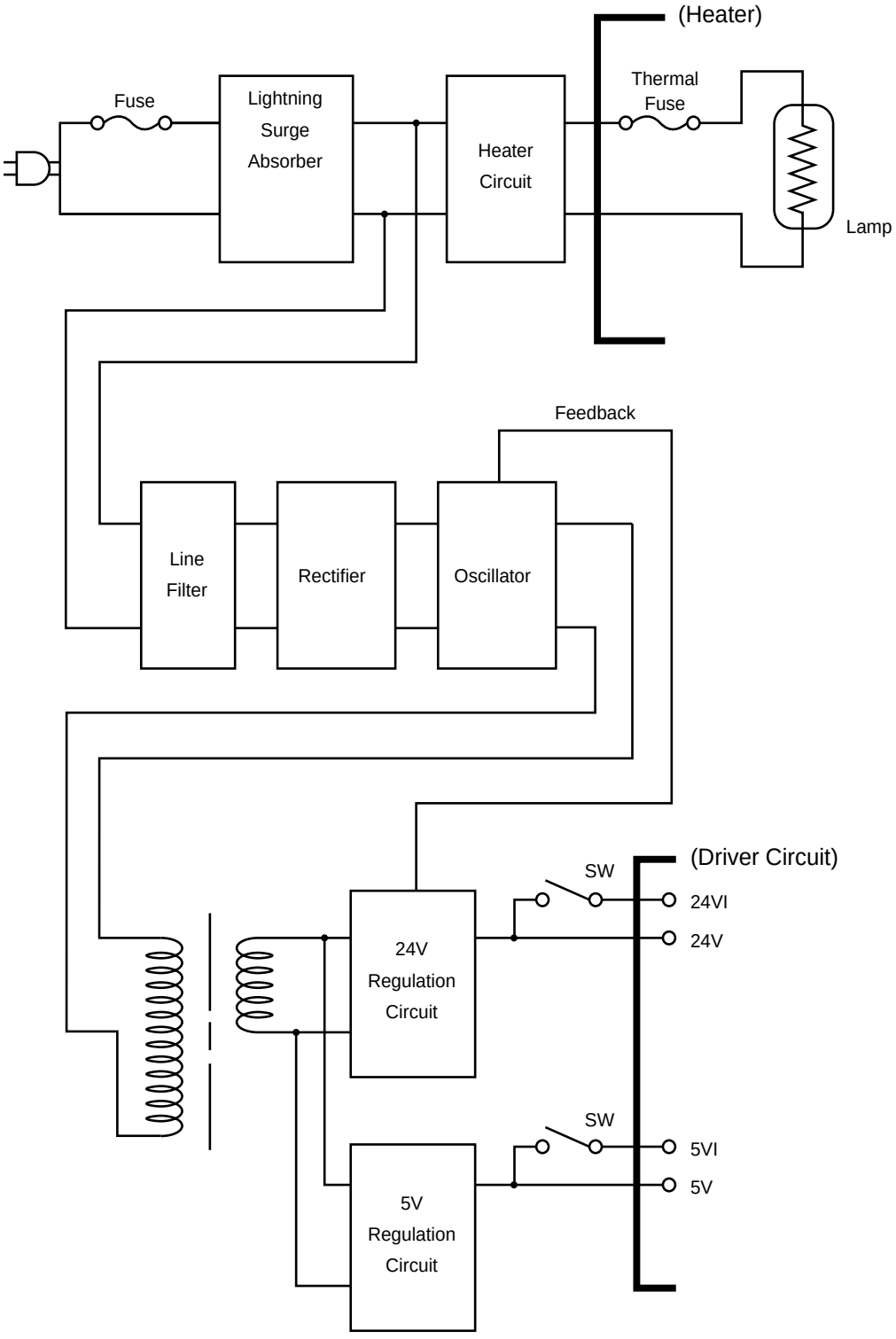


Fig. 2.18

2 MECHANICS

2.1 Overview of printing mechanism

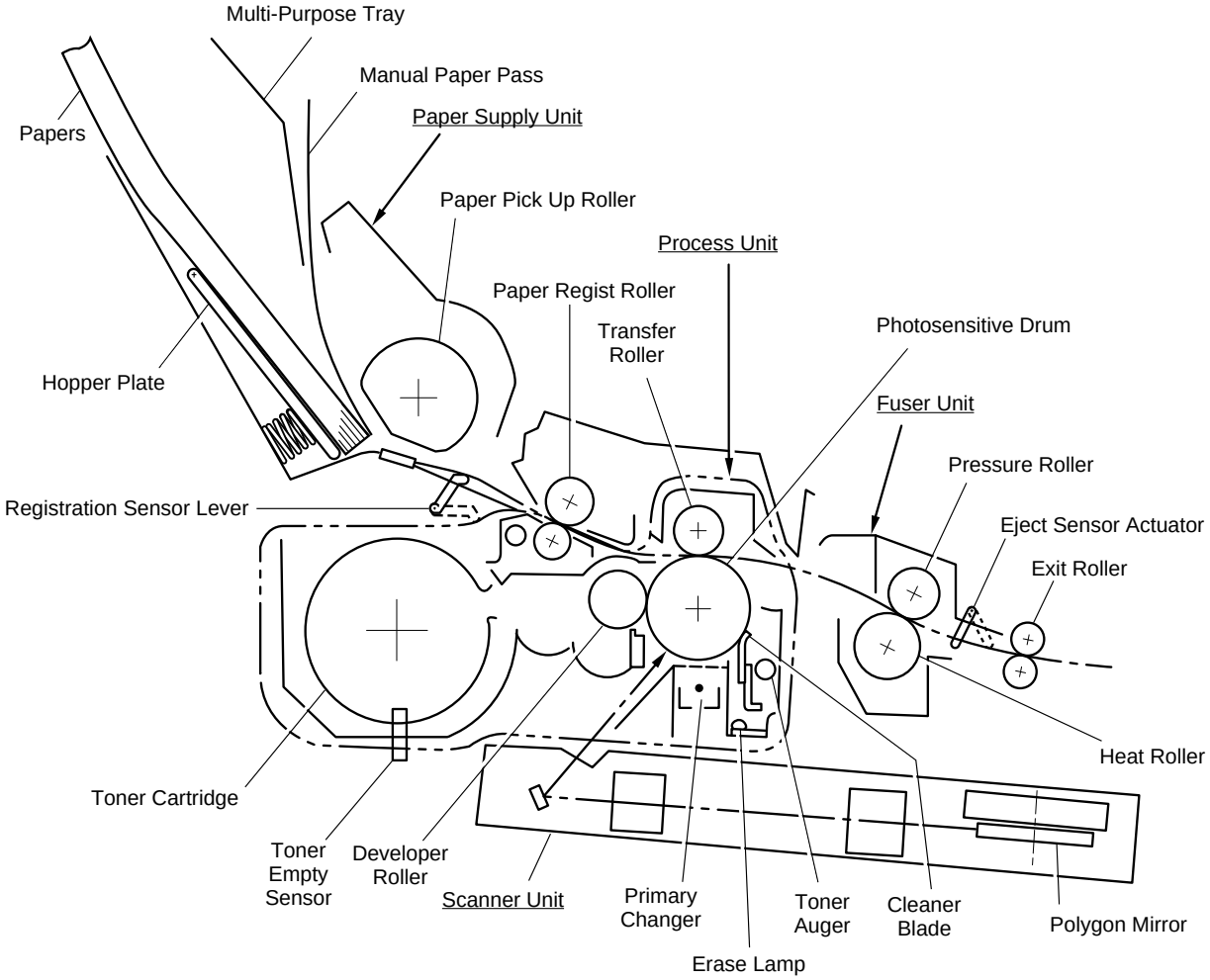
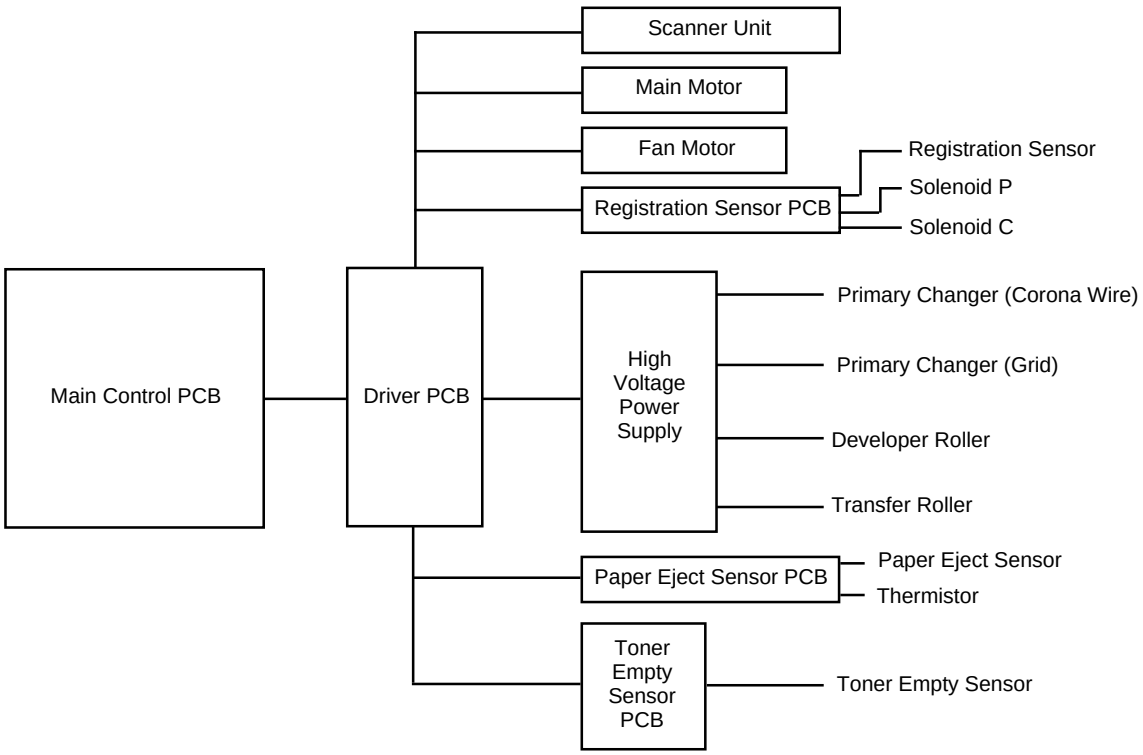


Fig. 2.19



2.2 Paper Transfer

2.2.1 Paper Supply

The pickup roller picks up one sheet of paper from the paper tray at every one rotation and feeds it to the registration roller one by one.

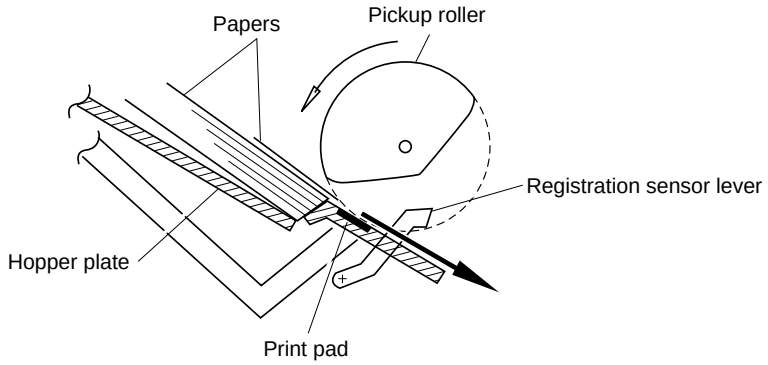


Fig. 2.20

The paper is gripped between the pickup roller and the separation pad and separated into individual sheets.

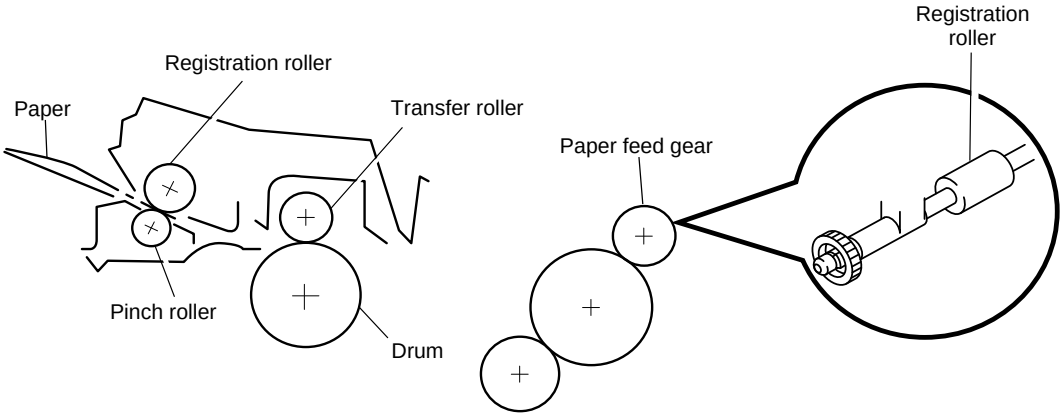
The pickup roller is directly connected to the sector gear, whose rotation is forcibly stopped by the gear stopper; when the pickup solenoid (solenoid C assembly) is activated, the gear stopper is released and the sector gear is driven; when it has completed one full turn its rotation is stopped again by the gear stopper.

The paper drawn out by the pickup roller presses against the top of form sensor lever and the paper top position/absence of paper is detected by sensing the motion of the lever.

2.2.2 Paper Registration

When paper picked up from the multi-paper tray (MPT) presses against the top of form sensor actuator, the registration sensor lever is caused to turn, and the photo sensor detects this motion.
With this signal from the sensor the registration roller is stopped of its rotation temporarily by the clutch. Then paper is fed to the nip point between the registration roller and the pinch roller in the process unit, and the skew of the paper is corrected by the bump of the leading edge of paper against the nip point.

When the registration roller starts to rotated again by the motion of clutch, paper, leading edge of which has been aligned, is fed by the registration roller and is transported to the transfer roller.



Clutch mechanism (engaged/released by the solenoid assembly)

Released when the solenoid is ON and engaged when the solenoid is OFF.

Fig. 2.21

2.2.3 Paper Eject

The completion of paper eject is detected in the following manner:

(a) when the leading edge of the paper push up the eject sensor actuator located in the fixing unit, the photo sensor (photo interrupter) is opened and detects the start of paper eject motion.

(b) After that, when the bottom of the edge of paper has passed through the paper eject sensor actuator, the photo sensor is closed and the completion of paper eject motion is recognized.

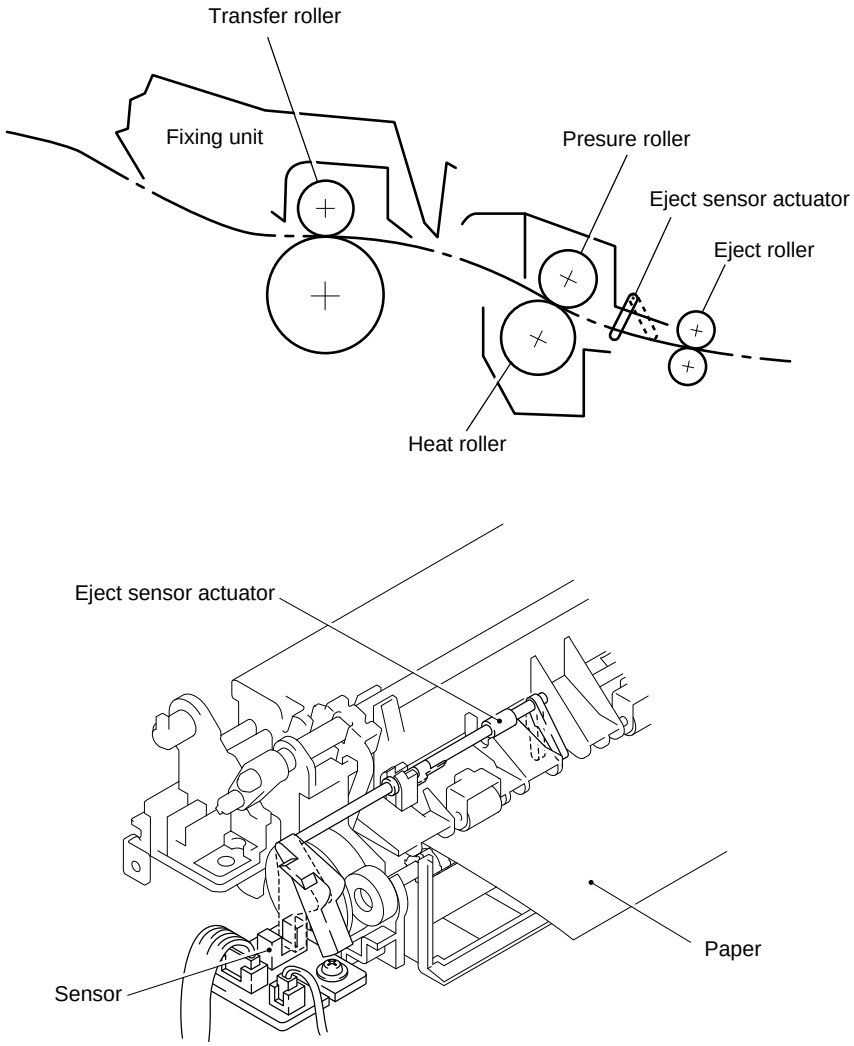


Fig. 2.22

2.3 Sensors

2.3.1 Multi-Paper Tray (MPT) Sensor

Detects whether or not the multi-paper tray is installed.

2.3.2 Cover Sensor

Detects open or close of the top cover.

2.3.3 Toner Empty Sensor

Detects if there is toner in the toner cartridge. It also detects whether or not the process unit is installed. (The toner cartridge is installed in the process unit).

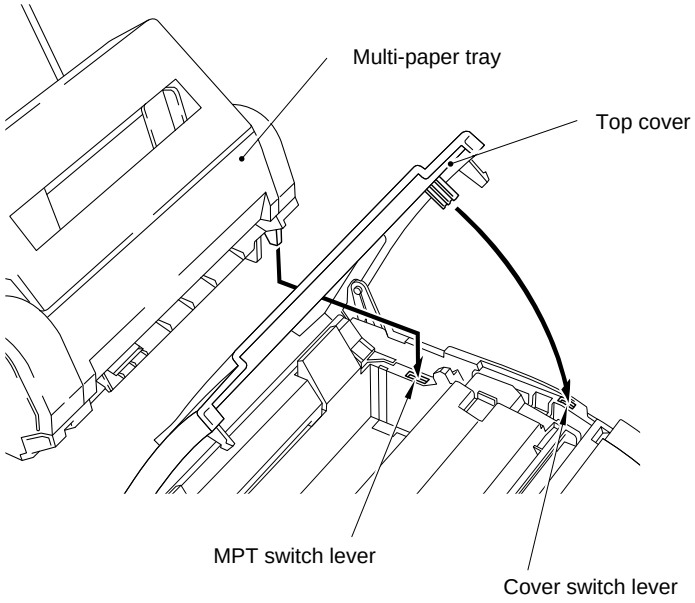


Fig. 2.23

2.4 Process Unit

2.4.1 Photosensitive Drum

Generates the latent electrostatic image and develops the image on the drum surface.

2.4.2 Primary Charger

Forms a uniform charge on the drum surface.

(1) Corona wire
Generates ion on the drum.

(2) Grid
Spreads the ion evenly over the drum.

2.4.3 Developer Roller

Develops the latent electrostatic image on the drum surface by the toner.

2.4.4 Transfer Roller

Transfers the toner image to the paper from the drum surface.

2.4.5 Cleaner Blade

Remove the toner remaining on the drum surface.

2.4.6 Toner Auger

Transport the waste toner from the cleaner to the developer unit.

2.4.7 Erase lamp

Discharges the electrostatic latent image on the drum.

2.5 Print Process

2.5.1 Charging

The drum is charged to appox +700V by ion which is generated by the primary charger. Ion is generated by an ionization of the corona wire, which applied DC bias from High Voltage Power Supply. The flow of ion is controlled by the grid to be distributed evenly on the drum surface. The other end of the grid is grounded to the frame through the varistor.

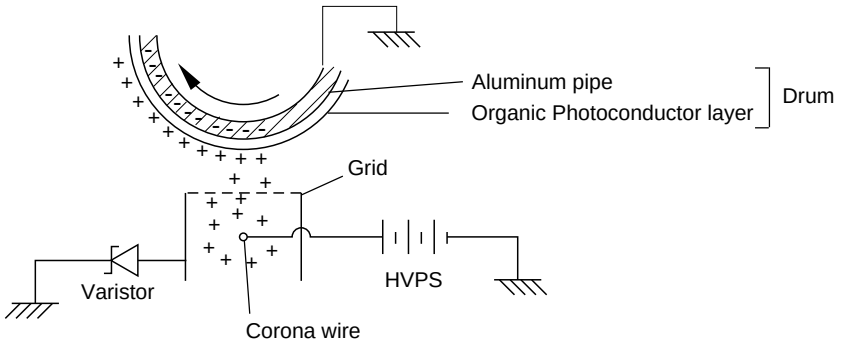


Fig. 2.24

The primary charge uses a corona wire, but since the charging terminal of the drum is a positive terminal , only less than 1/10 of the usual quantity of ozone is generated. The level of ozone expelled from the printer is therefore not harmful to the human body. Applicable safety standards have been complied with.

2.5.2 Exposure stage

After the drum is positively charged, it is exposed to the light emitted from the laser unit.

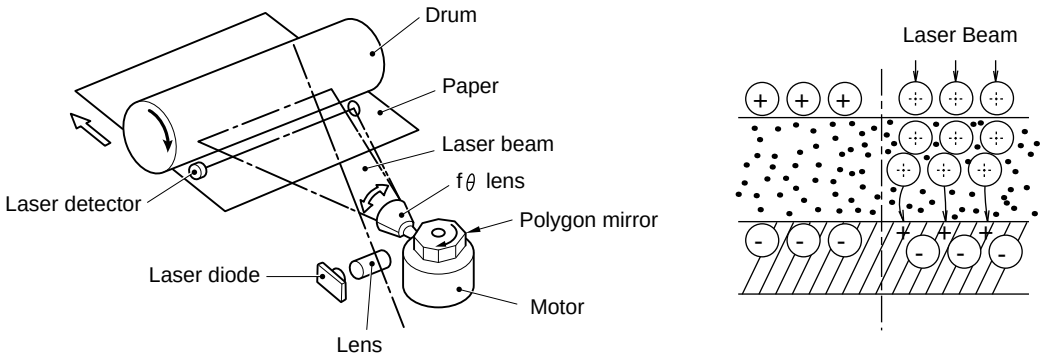


Fig. 2.25

The exposed area is the part to be printed. The surface potential of the exposed area is decreated forming an electrostatic image to be printed.

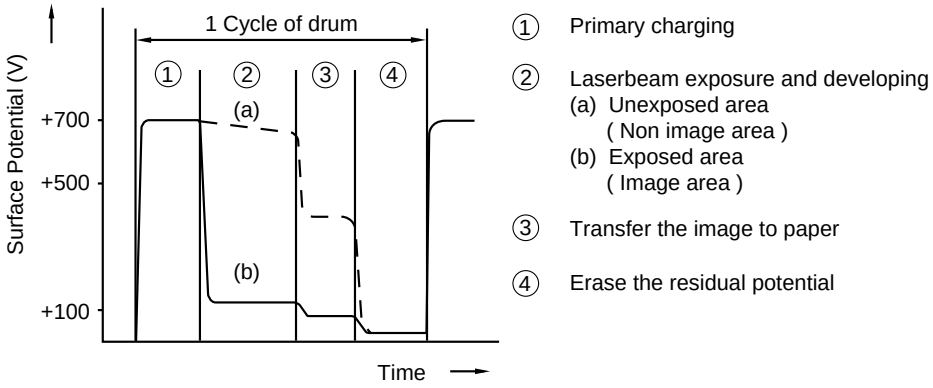


Fig. 2.26

2.5.3 Developing

Developing causes the toner to be attracted to the electrostatic image on the drum so as to transform it into a visible image.

The Developer Consists of the magnetic carrier and the magnetic toner. The developer makes the magnetic brush on the developer roller which includes the rotatable magnet roller. The magnetic brush softly rubs the drum, and then only the toner developed on the latent electrostatic image.

The carrier particles are attracted to the developer roller.

The toner receives a positive static charge as the toner particles rub against the carrier particle, rotating developer roller, and trimmer blade. Electrostatic field between the drum and the developer roller, which is DC-biased from the High voltage power supply, makes electrostatic potential to attract toner particles from the developer roller to the drum.

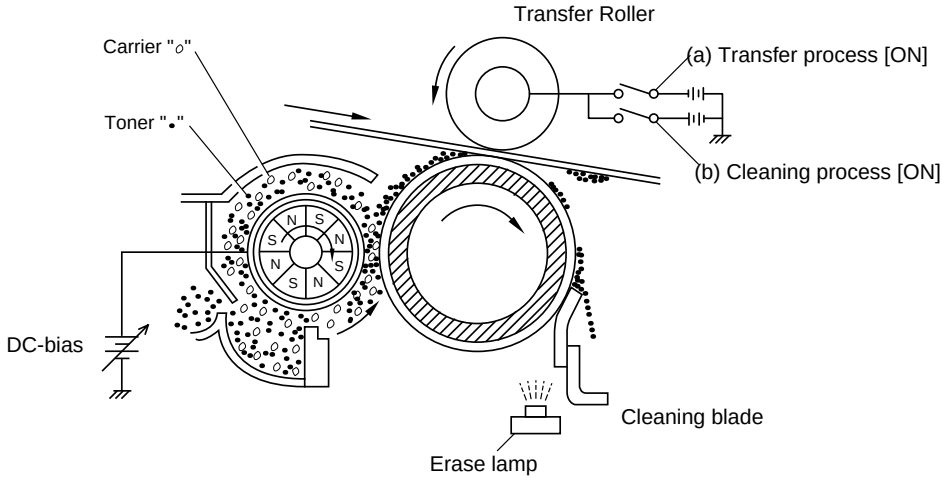


Fig. 2.27

2.5.4 Transfer

(a) Transfer process

After the drum has been charged and exposed, and has received a developed image, the toner formed image is transferred onto the paper , applying the negative charge from the backside of the paper. The negative charge to the paper causes the positive charged toner to leave the drum, and adhere to the paper. As a result, the image is visible on the paper.

(b) Cleaning process of transfer roller

If the toner is not transferred onto the paper perfectly due to jamming etc., it is possible that the toner adheres to the charge transfer roller. The transfer voltage charges to positive voltage during non transferring process.

Therefore the transfer roller is cleaned by returning the positive charged toner adhered on the transfer roller onto the photo-conductive drum.

2.5.5 Drum Cleaning Stage

In the image transfer stage, not all the toner on the photosensitive drum is transferred onto the paper but some of them remain on the drum. In the drum cleaning stage, the drum surface is cleaned by the cleaning blade, so that residual toner on the drum surface is removed away and collected in the cleaning housing. In the cleaning housing, collected toner is transported to the developer unit by the toner auger. This toner is mixed with new toner and is used again at the developing stage.

2.5.6 Erasing Stage

After the cleaning stage, the drum surface is exposed by the light emitted from the erase lamp. (LED lamp) This stage prepares the drum to decrease its surface voltage uniformly, and to receive an uniform change in the primary charging stage.

CHAPTER III DISASSEMBLY AND REASSEMBLY

1 SAFETY PRECAUTIONS

To prevent the creation of secondary problems by mishandling, be careful about the following precautions during maintenance work.

(1) Always turn off the power before replacing parts or units. When accessing the power supply PCB or components, be sure to unplug the power cord from the power outlet.

(2) Be careful not to lose screws, washers, or other parts removed.

(3) Be sure to apply grease to the gears and applicable popsitions specified in this chapter.

(4) When using soldering irons or other heat-generating tools, take care not to damage the resin parts such as wires, PCBs, and covers.

(5) Before handing the PCBs, touch a metal portion of the equipment to discharge the static electricity charged in your body, or the electronic parts or components may be damaged.

(6) When transporting PCBs, be sure to wrap them in conductive sheet such as aluminum foil.

(7) Be sure to replace self-tapping screws correctly, if removed.
Unless otherwise specified, tighten screws to the following torque values.

TAPTITE, BIND or CUP B

M3 : 6kgf • cm

M4 : 9kgf • cm

TAPTITE, BIND S

M3 : 9kgf • cm

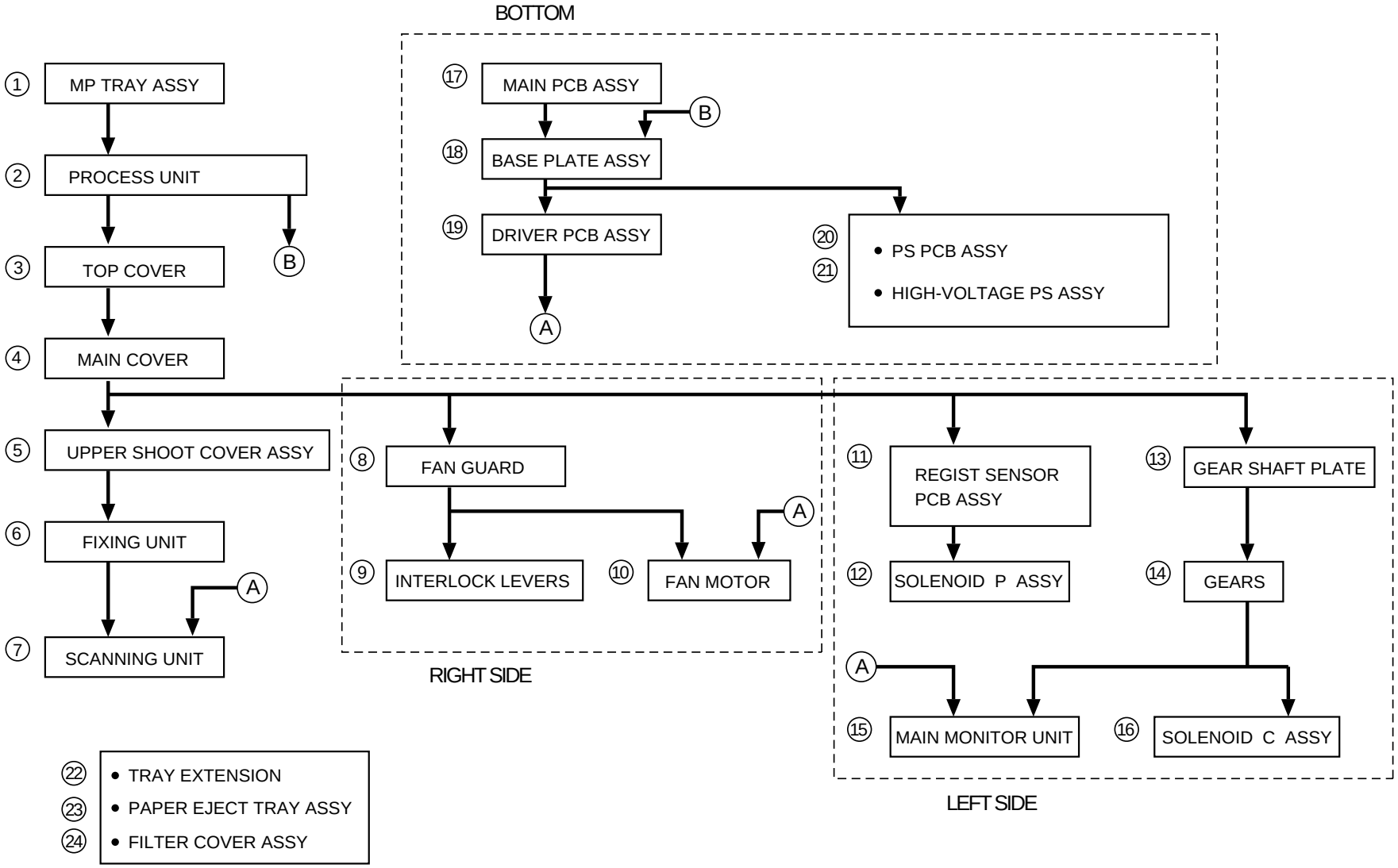
SCREW

M3 : 7kgf • cm

M4 : 10kgf • cm

(8) When connecting or disconnecting cable connectors, hold the connector bodies, but not the cables. If the connector has a lock, release the connector lock first to unlock it.

(9) After a repair, check not only the repaired poprtion but also the connectors, or check if other related portions are functioning properly before doing operation checks.


BOTTOM
1 MP TRAY ASSY
2 PROCESS UNIT
3 TOP COVER
4 MAIN COVER
5 UPPER SHOOT COVER ASSY
6 FIXING UNIT
7 SCANNING UNIT
A
B
17 MAIN PCB ASSY
18 BASE PLATE ASSY
19 DRIVER PCB ASSY
20
21
• PS PCB ASSY
• HIGH-VOLTAGE PS ASSY
8 FAN GUARD
9 INTERLOCK LEVERS
10 FAN MOTOR
RIGHT SIDE
11 REGIST SENSOR PCB ASSY
12 SOLENOID P ASSY
13 GEAR SHAFT PLATE
14 GEARS
15 MAIN MONITOR UNIT
16 SOLENOID C ASSY
LEFT SIDE
22 • TRAY EXTENSION
23 • PAPER EJECT TRAY ASSY
24 • FILTER COVER ASSY

3 DISASSEMBLING PROCEDURE

3.1 Multi-purpose Paper Tray

(1) Lift the multi-purpose paper tray upward to remove it.

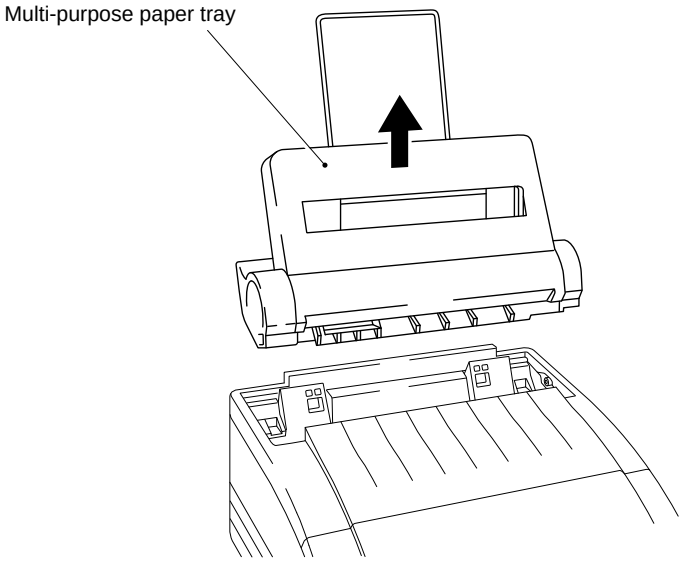


Fig. 3.1

3.2 Process unit

(1) Open the top cover.

(2) Release the locks of the upper shoot cover and open it out toward the front of the printer.

(3) Lift out the process unit.

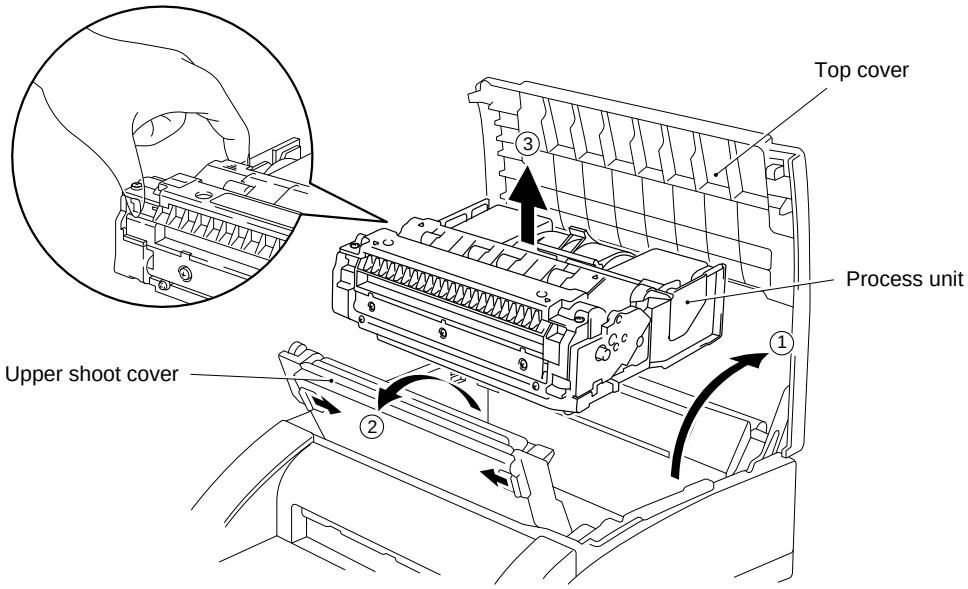


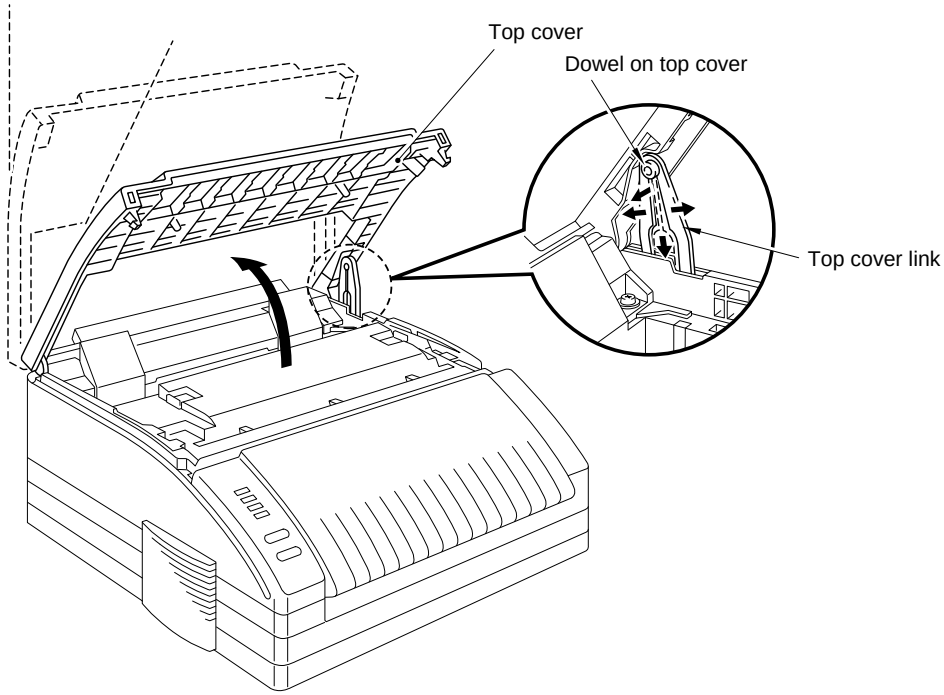
Fig. 3.2

3.3 Top Cover

(1) Open the top cover to the first lock position.

(2) Prize up the top cover link and free it from the dowel on the top cover to release it inward.

(3) Press the link downward.



(4) Open the top cover further, release the catch of the right side by lifting the top cover upward and then slide the top cover leftward.

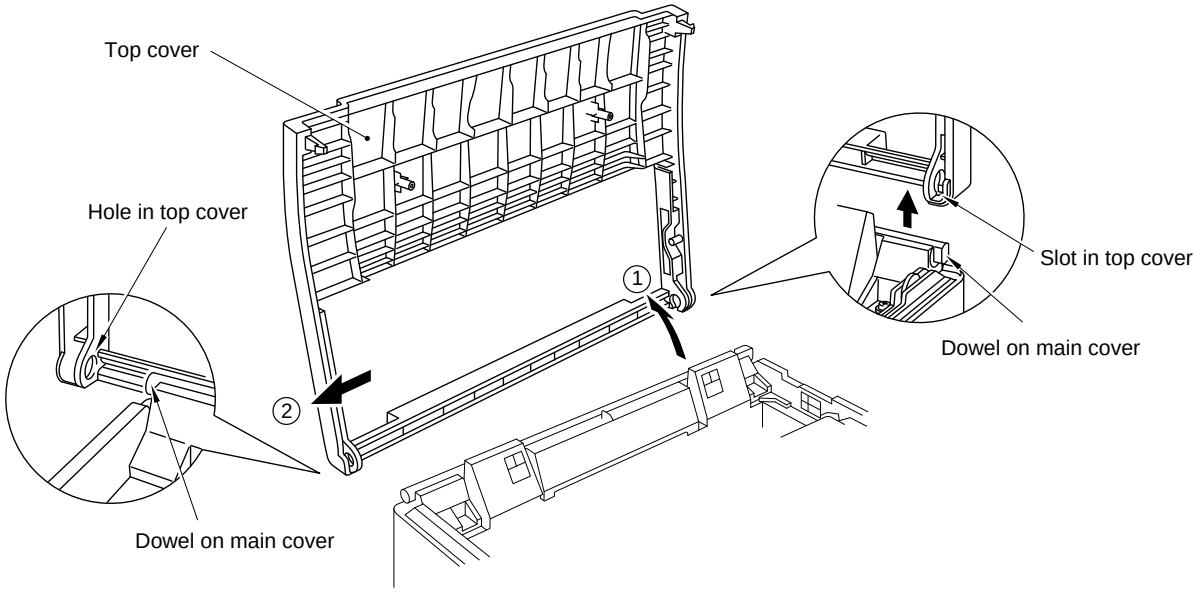


Fig. 3.3

3.4 Main Cover

(1) Remove the four screws securing the main cover.

(2) Release the catch on the bottom of the front face of the main cover and lift the main cover upward.

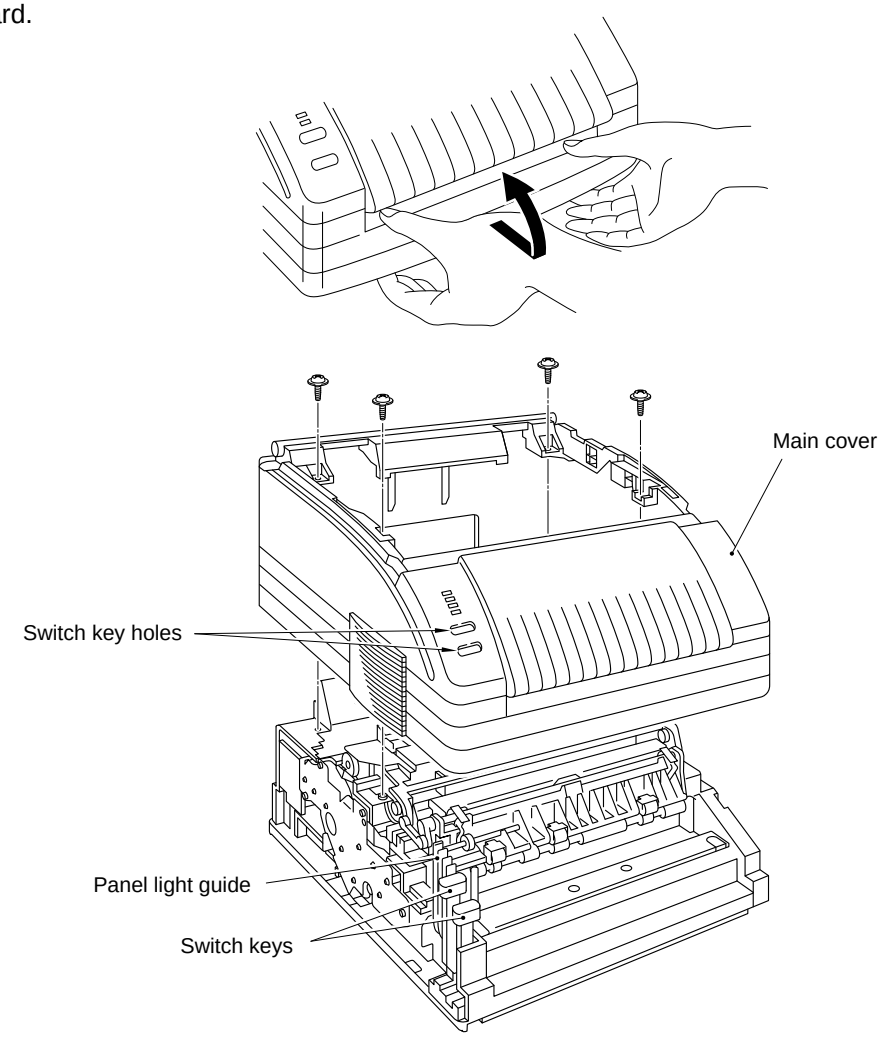


Fig. 3.4

NOTE: When fitting the main cover, the switch key and panel light guide (on this left side) must be carefully inserted into the corresponding holes in the main cover.

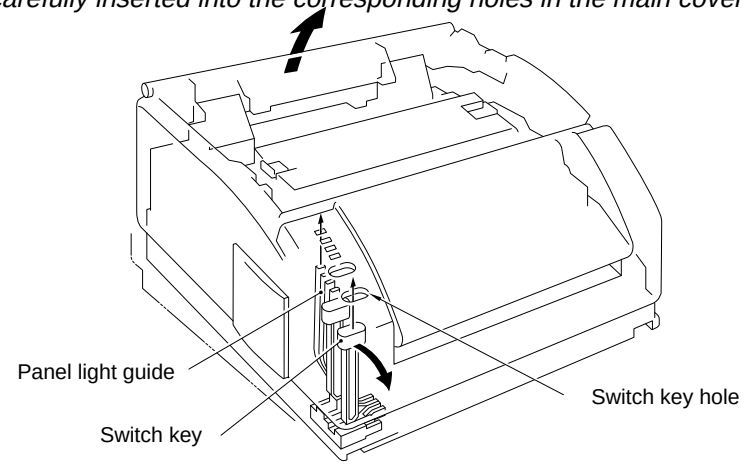


Fig. 3.5

3.5 Upper Shoot Cover

(1) Open the upper shoot cover

(2) Push down the release link and release it from the dowel on the fixing unit.

(3) Release the locks on the upper shoot cover, then remove the upper shoot cover from the frame by sliding it to the left.

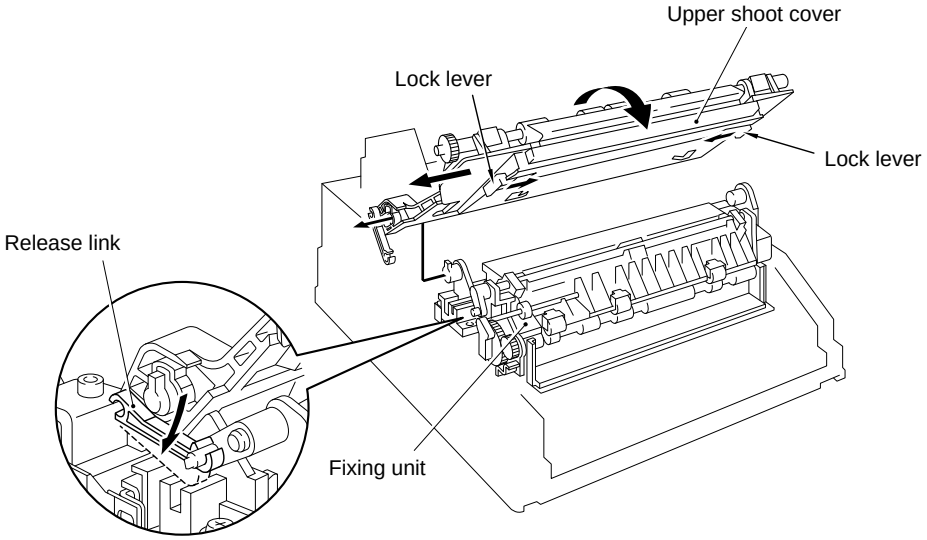


Fig. 3.6

3.6 Fixing Unit

(1) Disconnect the fixing unit connector on the left side.

(2) Remove the three screws securing the fixing unit.

(3) Lifting up the fixing unit, disconnect the two heater harnesses on the right side.

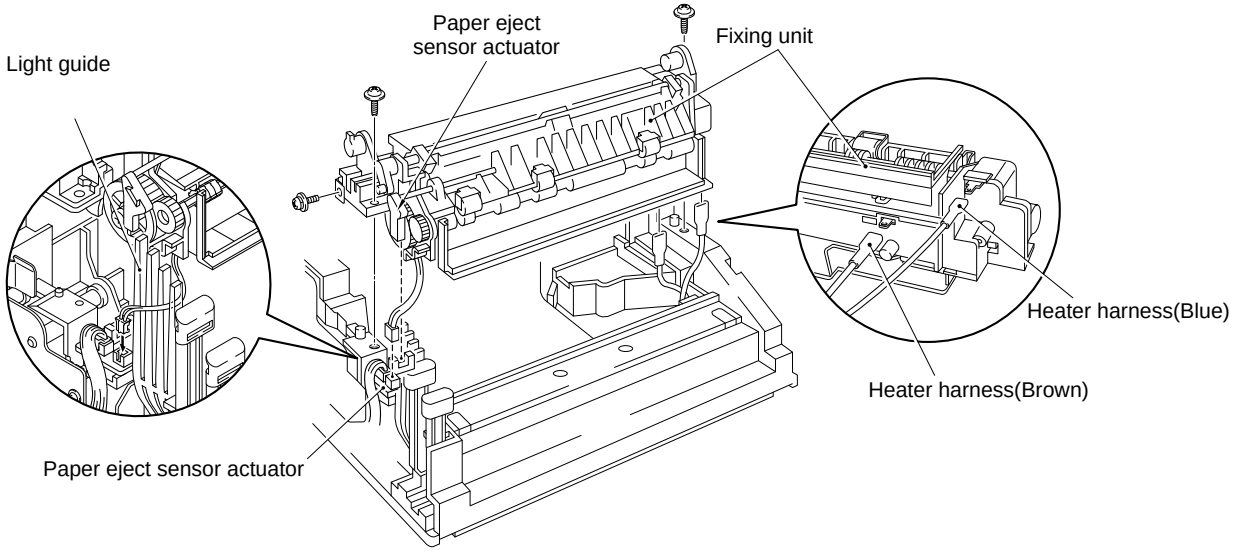


Fig. 3.7

NOTE: When attaching the fixing unit, be sure to connect the fixing unit connector and the two heater harnesses.
Be careful not to damage the paper eject sensor actuator.

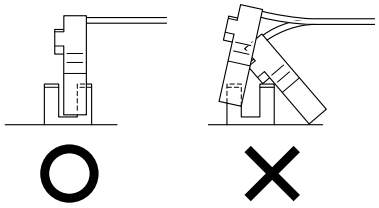


Fig. 3.8

3.7 Scanner Unit

(1) Disconnect the two connectors of the scanner unit from the driver PCB (Refer to 3.19).

(2) Remove the four screws.

(3) Lift out the scanner unit.

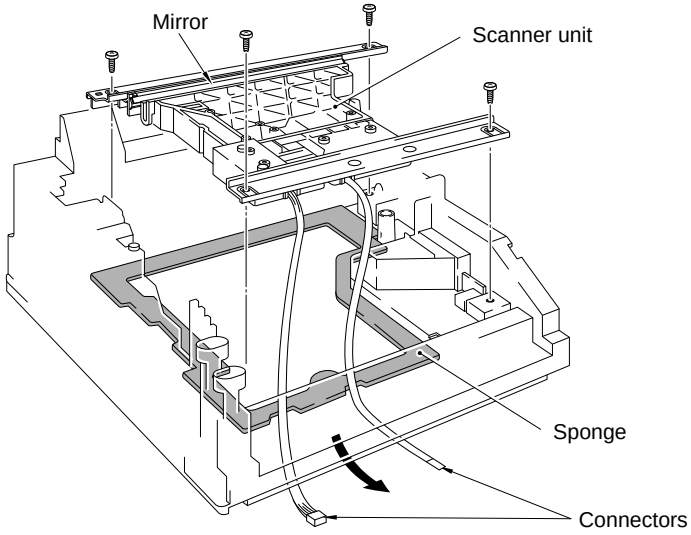


Fig. 3.9

NOTE: Never touch the inside of the scanner unit or the mirror when disassembling or reassembling. If there is any garbage or dust on the mirror, blow it off.

3.8 Fan Guard

(1) Remove the two screws securing the fan guard, and take it off.

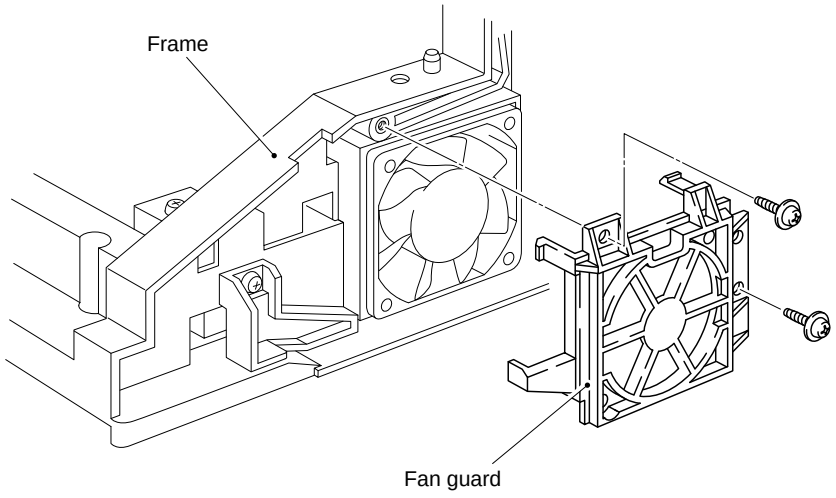
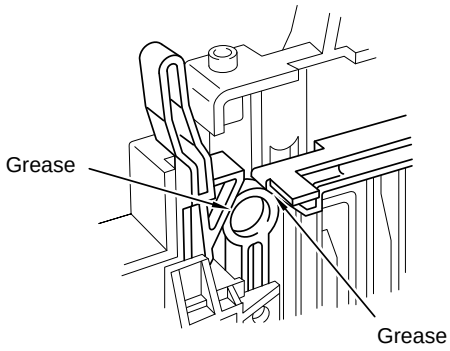


Fig. 3.10

3.9 Interlock Levers

(1) Grease the contacting portions of the interlock levers on assembly.



Grease: MolyKote EM30L

Fig. 3.11

3.10 Fan Motor

(1) Disconnect the connector from the driver PCB (Refer to 3.19).

(2) Take off the fan motor.

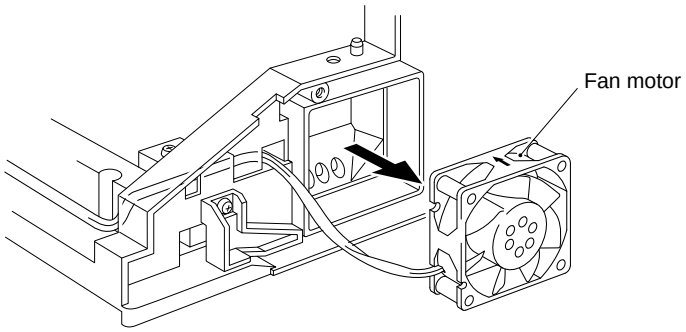


Fig. 3.12

3.11 Registration Sensor PCB

(1) Remove the screw of the registration sensor PCB.

(2) Disconnect three connectors from the Registration sensor PCB.

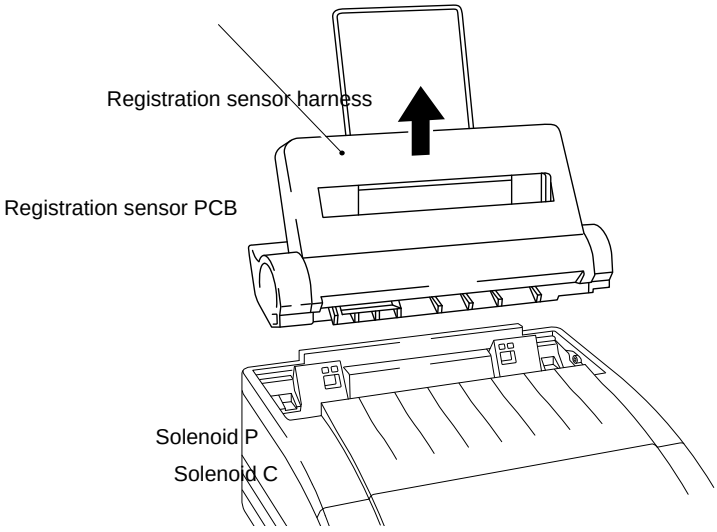


Fig. 3.13

3.12 Solenoid P

(1) Pull out the solenoid P from the frame by releasing the hook of the solenoid lever.

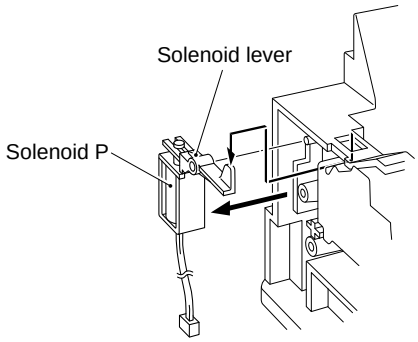
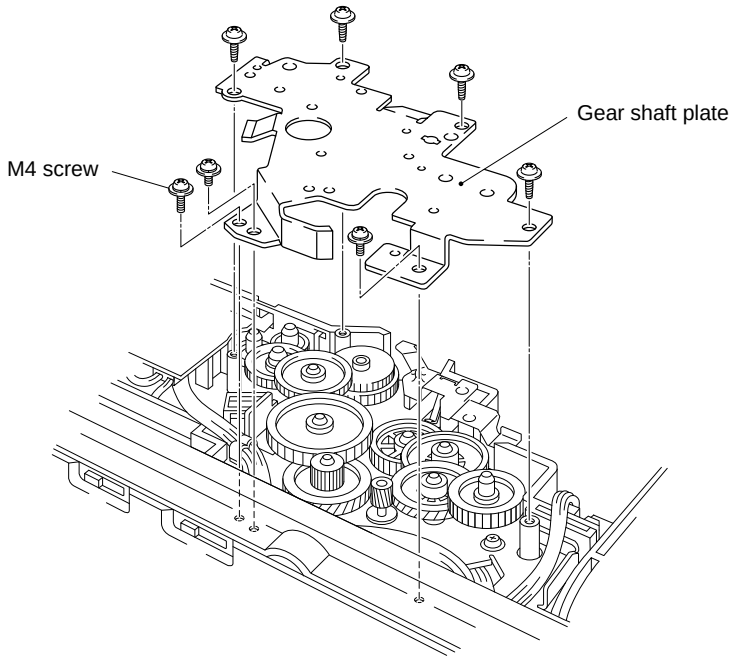


Fig. 3.14

3.13 Gear Shaft Plate

(1) Remove the seven screws securing the gear shaft plate.



NOTE: On re-assembly, run the registration sensor harness along the route shown in the figure below.

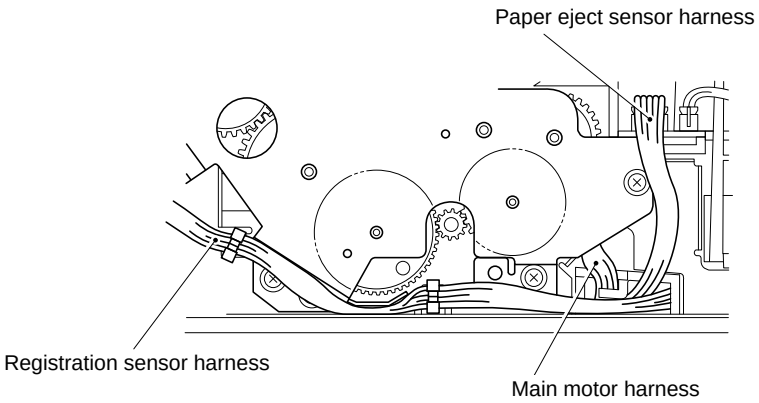
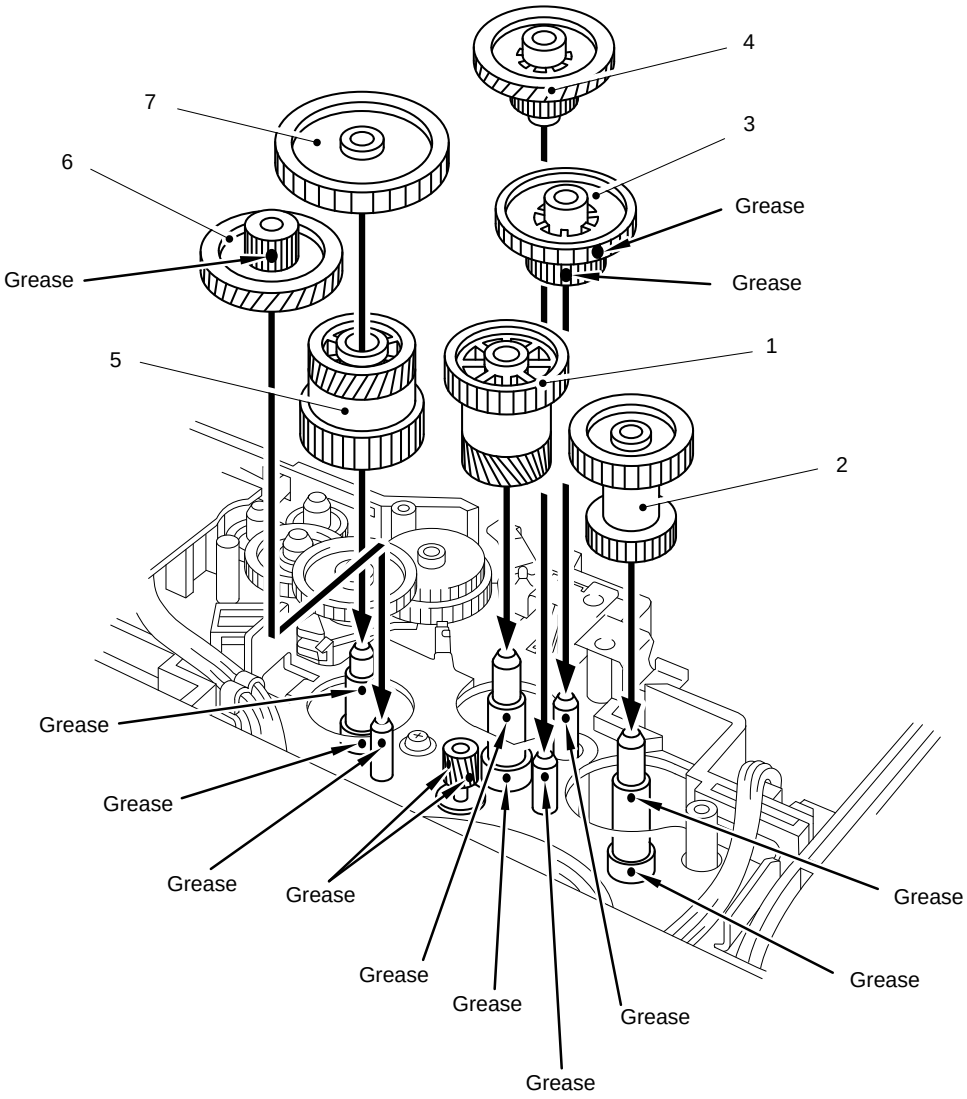


Fig. 3.15

3.14 Gears

(1) Grease the metal gear shafts and gear surfaces on the specified portion illustrated below when reassembling.



Grease: MolyKote EM30L

Fig. 3.16

3.15 Main Motor Unit

(1) Disconnect three connectors from the driver PCB (Refer to 3.19).

(2) Remove two screws securing the main motor unit.

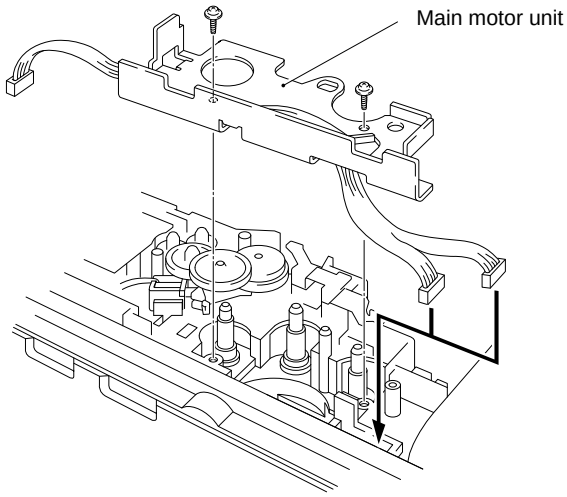
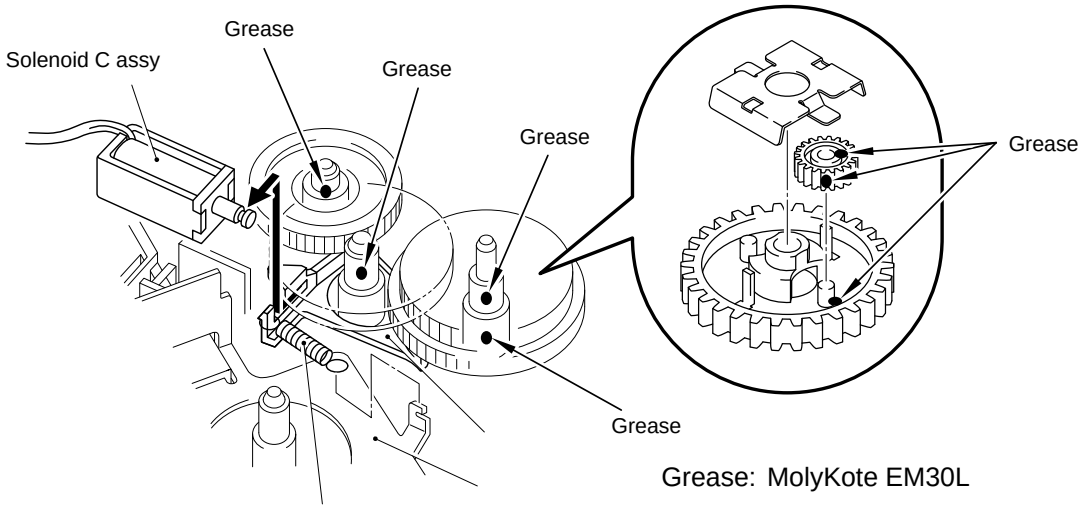


Fig. 3.17

3.16 Solenoid C

(1) Remove the spring of the solenoid C.

(2) Remove the solenoid C.



Grease: MolyKote EM30L

Fig. 3.18

NOTE: When re-assembling, grease up to the specified portions of each gear shown in the above figure.

3.17 Main PCB

(1) Remove three screws securing the main PCB holder on the back side of the printer.

(2) Grasp the hooks at left and right and draw out the main PCB assembly.

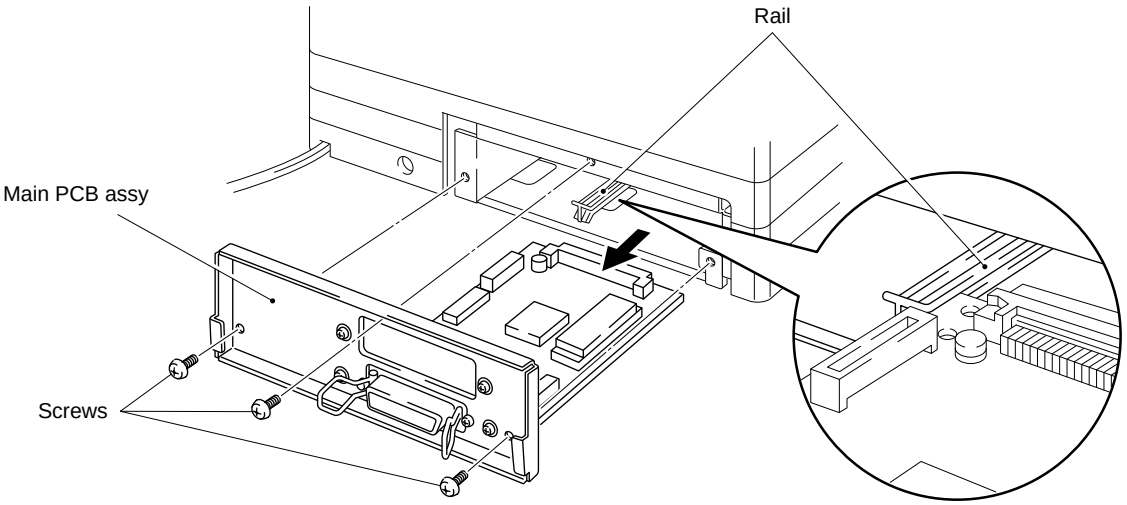


Fig. 3.19

3.18 Base Plate

NOTE: Prior to turning the printer upside-down, the multi-purpose tray assembly and process unit should be removed from the printer.

(1) Turn the printer upside down.

(2) Remove the eight self-tapping screw, one M3 screws and two M4 screws.

(3) Lift out the base plate and remove the grounding screw.

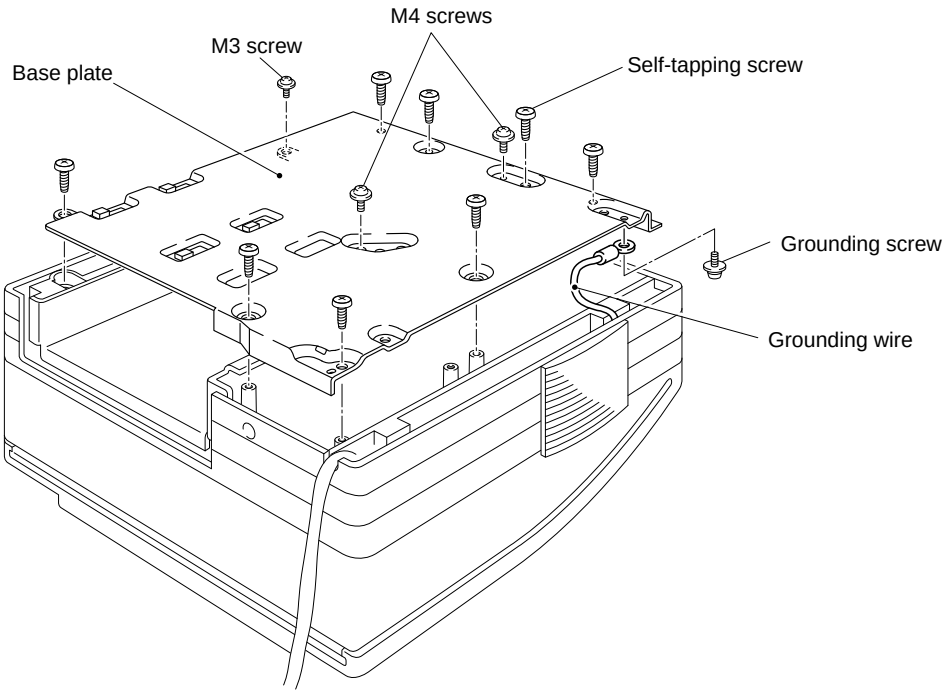


Fig. 3.20

NOTE: Install the grounding wire after fitting the base plate so that it does not contact the soldered side of the base plate.

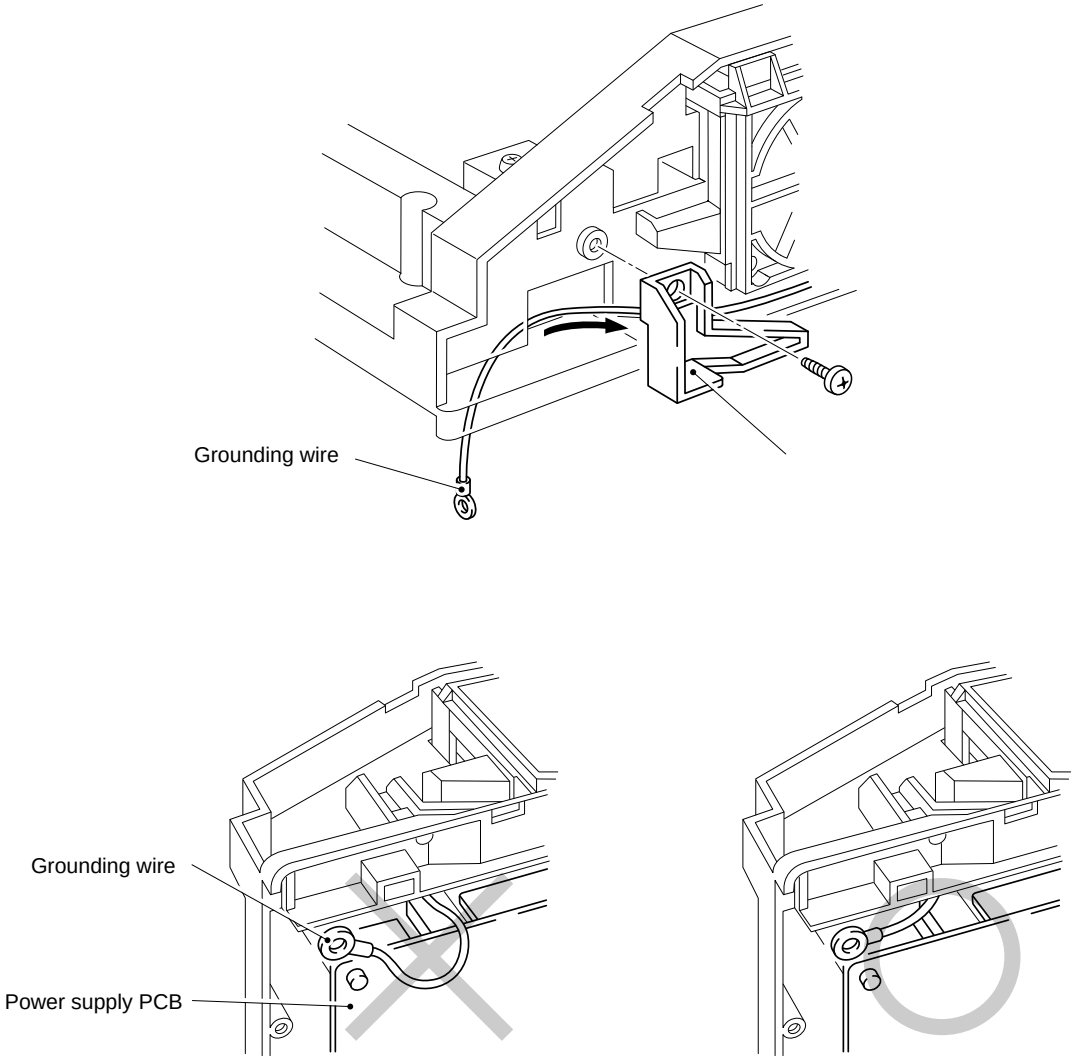


Fig. 3.21

3.19 Driver PCB

(1) Remove the two screws securing the driver PCB.

(2) Disconnect the ten connectors from the PCB.

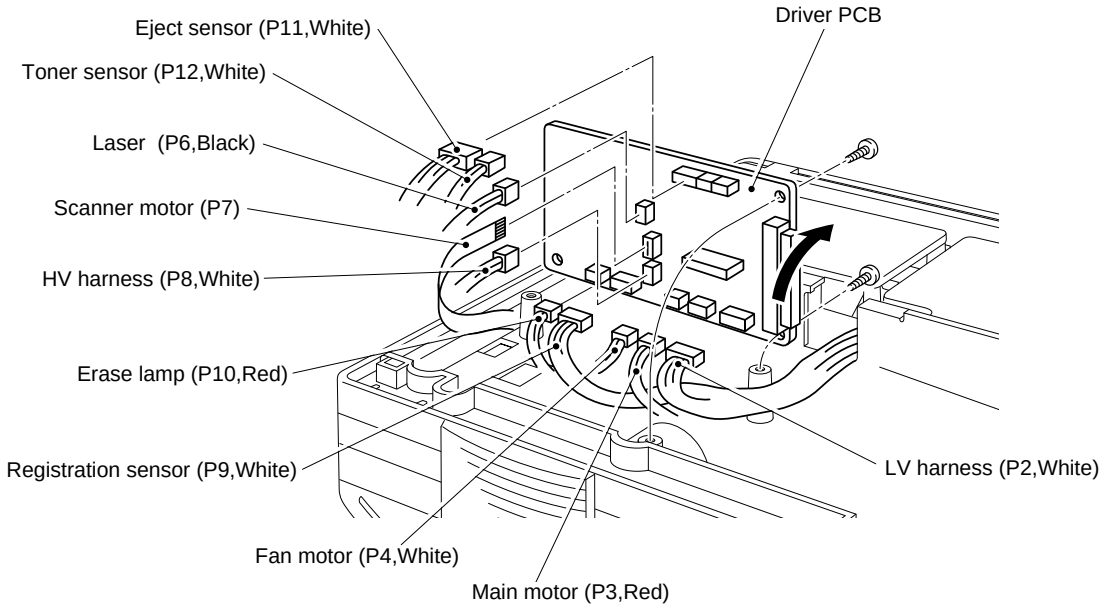


Fig. 3.22

NOTE1: When reassembling, the connectors must be inserted to the PCB without floating and the PCB must not be floated by the harnesses.

NOTE2: The connector should be inserted by fitting the housing color and the pin number.

3.20 Power Supply PCB

(1) Disconnect the three connectors from the component side of the PCB.

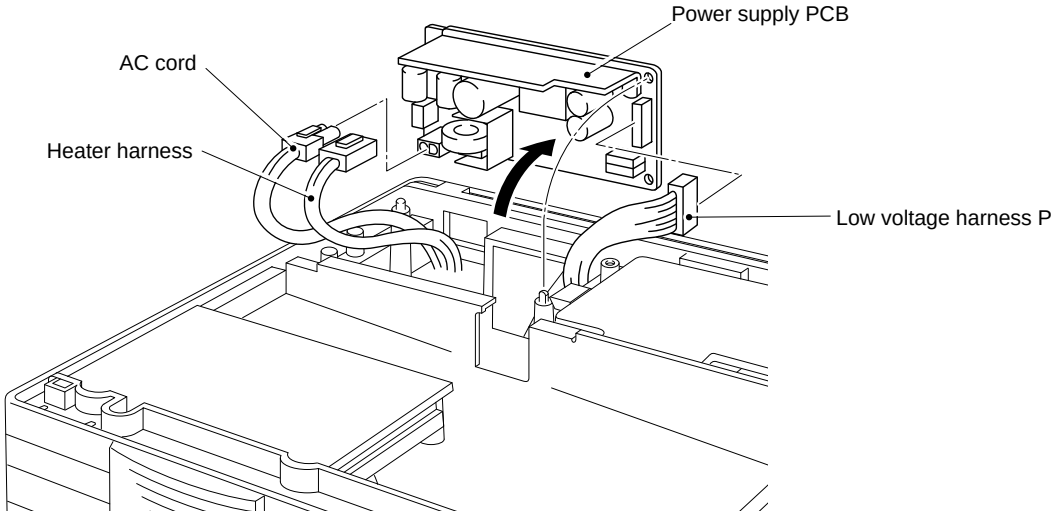


Fig. 3.23

3.21 High-voltage Power Supply

(1) Remove the screw securing the high voltage power supply PCB.

(2) Disconnect the two connectors from the PCB.

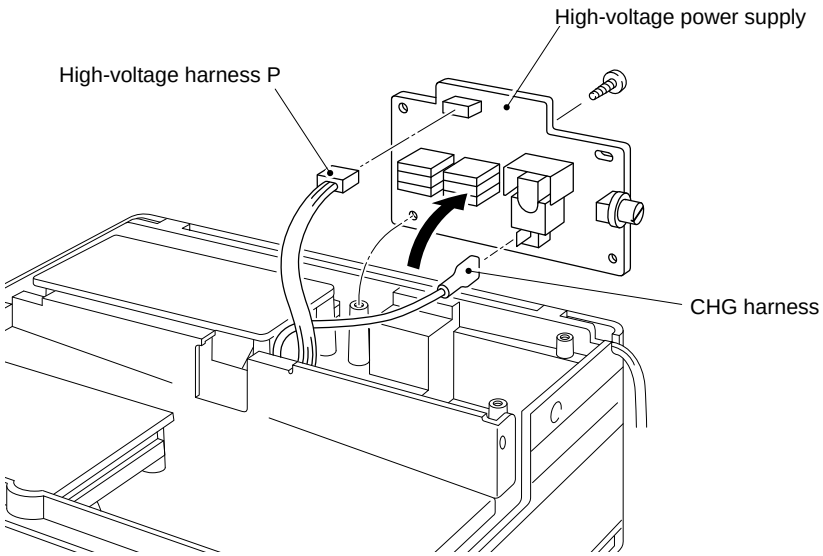


Fig. 3.24

3.22 Tray Extension

(1) Pull the manual paper tray down toward the front of the printer.

(2) Put the tray extension down toward the front of the printer, and press the bottom of its both side legs inward to release it.

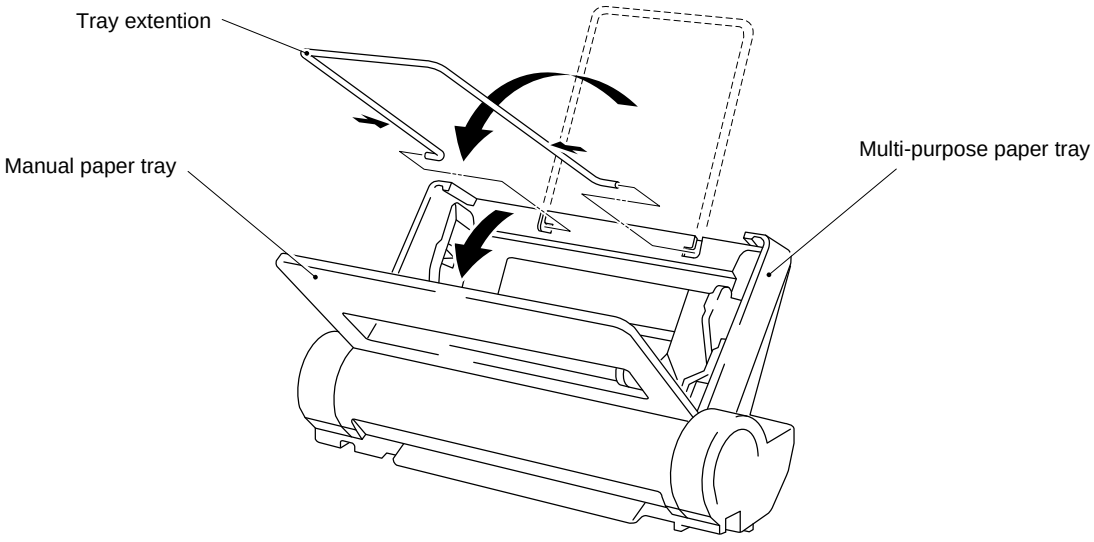


Fig. 3.25

3.23 Paper Eject Tray

(1) Open the paper eject tray.

(2) Press the both sides of hinges of the paper eject tray inward to release it from the dowels on the main cover.

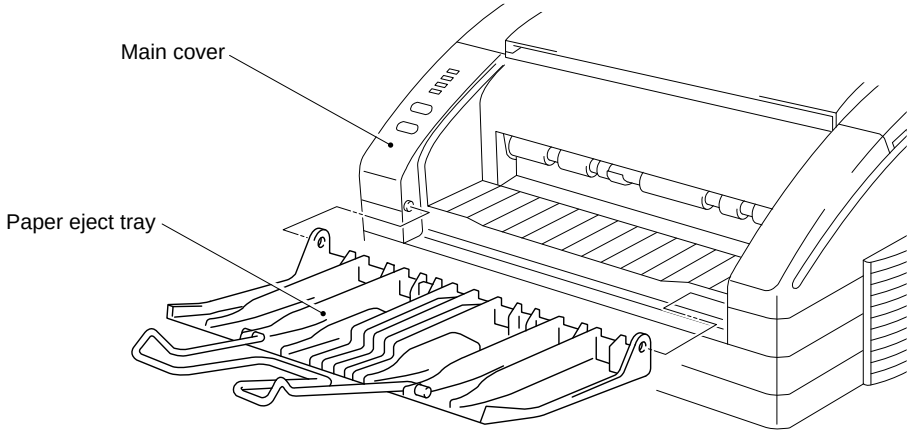


Fig. 3.26

3.24 Filter Cover

(1) Press down on the central part of the top of the filter cover and pull it out toward you to release the catch.

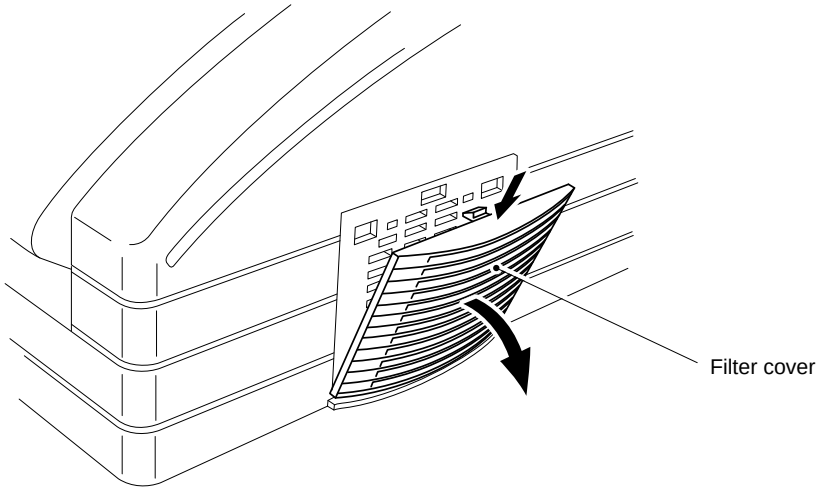


Fig. 3.27

4. PACKING

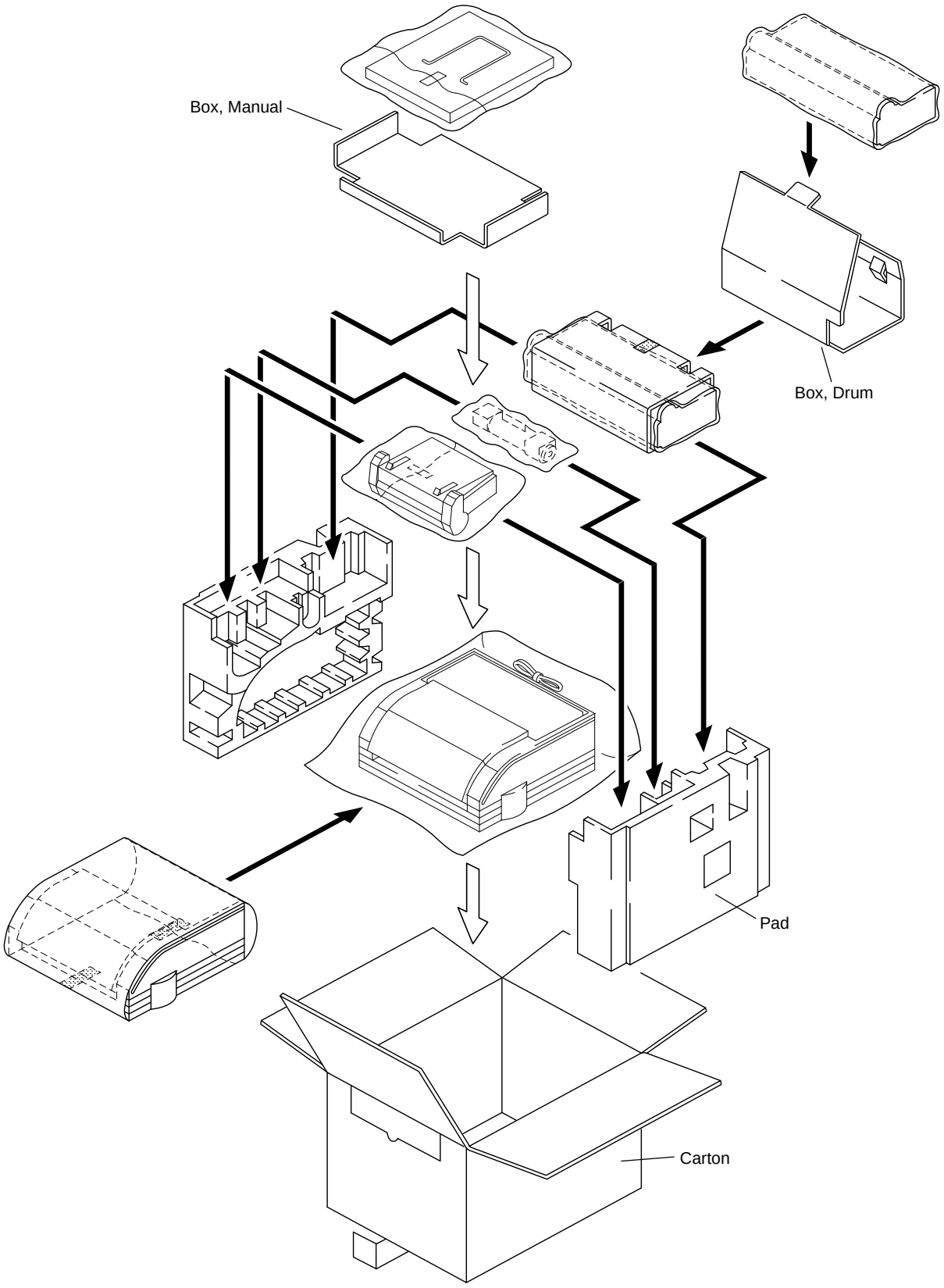


Fig. 3.28

CHAPTER IV TROUBLE SHOOTING

1 INTRODUCTION

1.1 Initial check

(1) Operating environment

Check if :

1) The souce voltage stays within ±10% from the rating voltage shown on the rating plate.

2) The printer is installed on a solid, level surface.

3) The room temperature is maintained between 10°C and 32.5°C. The relative humidity is maintained between 20% and 80%.

4) The printer is not exposed to ammonia fumes or other harmful gases.

5) The printer is not located in a hot or humid area (such as near water or a humidifier)

6) The printer is not exposed to direct sunlight.

7) The room is well-ventilated

(2) Printer paper

Check if :

1) A recommended type of print paper is being used (if the paper is too thick or too thin, or tends to curl, paper jams or paper feed problems may occur, or prints may be blurred).

2) the print paper is damped. [If so, use fresh paper, and check whether the print quality improves or not.]

(3) Consumables

Check if :

1) The toner LED is not lit on the display when a toner cartridge is installed in the printer. [If the above LED is lit, replace the cartridge with a new one. If blank spots occur on prints, take out the process cartridge and slowly rock it to distribute the toner evenly.]

(4) Others

Check if :

1) The transfer guide and feed guide are clean. [If not, clean them with a damp cloth.]

Condensation:

When the printer is moved from a cold room into a warm room in cold weather, condensation may occur inside the printer, causing various problems as below:

1) Condensation on the optical surface such as the scanning mirror, lenses, the reflection mirror and the protection glass may raise the print image to be light.

2) If the pfotosensitive drum is cold, the electrical resistance of the photosensitive layer gets high, making it impossible to obtain a correct contrast in printing.

3) Condensation on the corona unit may cause corona leakage.

4) Condensation on the pick-up guide and feed guide plates may cause paper feed troubles .

If condensation has occured, wipe the effected units or parts with a dry cloth.

If the process cartridge is unsealed soon after moved from a cold room to a warm room, condensation may occur inside the cartridge, which may cause incorrect image. Instruct the user to allow the cartridge to come to to room temperature before unsealoing it. This will take one to two hours.

1.2 Basic Procedure

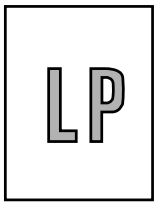
If a manufunction or incorrect print is appeared, make an initial check, then follow the basic procedure below:

(1) Check the error lamps according to the procedure of inspection mode described on the later pages of this section. If no error lamp is lit, see Section 4 for troubleshooting.

(2) If any incorrect image is found, follow the imafe defect description in this section.

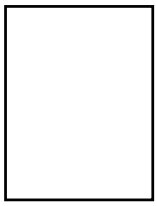
2. IMAGE DEFECTS

2.1 Image Defect Example

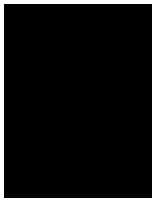


1-1 Light

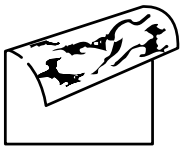
1-2 Dark



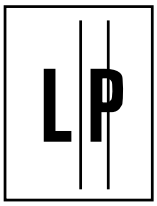
1-3 Completely blank



1-4 All black



1-5 Dirt back of paper

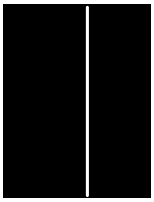


1-6 Black vertical streaks

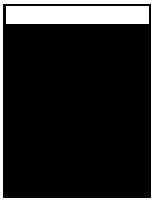
1-6 Black and blurred vertical stripes

1-7 Black and blurred horizontal stripes

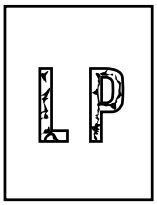
1-8 Dropout



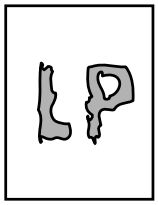
1-9 White vertical streaks



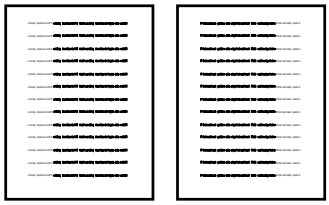
1-10 Faulty registration



1-11 Poor fixing



1-12Å@mage distortion



1-13 Blurred at either side

Fig. 4.1

2.2 Troubleshooting Image Defect

Procedures to follow in response to specific image defects.

I-1	Light

Possible cause	Step	Check	Result	Remedy
Poor contrast	1	Is the contrast adjustment dial in the center of click position?	No	Set it to the center click position or reasonable position.
Toner sensing failure (toner cartridge side)	2	Is the problem solved when 4 or 5 pages are printed after the cartridge is replaced with a full one?	Yes	The wiper of the toner cartridge is defective. Replace the toner cartridge.
Toner sensing failure (printer side)	3	Can printing be started with the drum unit removed?	Yes	Toner sensor failure. Check if the toner sensor needs cleaning and check the toner sensor connection.
Drum GND connection failure	4	Is the drum shaft grounded when the drum unit is installed?	No	Clean contact electrodes between the printer body and the drum shaft of drum unit .
Transfer electrode contact failure	5	Is there continuity between the transfer roller shaft and the transfer electrode on the external drum unit?	Yes	Replace the drum unit.
Transfer failure	6	Is the problem solved when the transfer roller is replaced?	Yes	Replace the drum unit.
Developing bias contact failure	7	Are the developing bias contacts between the printer body and the drum unit soiled?	Yes	Clean the terminals of both sides.
High-voltage power supply failure	8	Remove the main cover and measure the voltage at the electrode plate at the right side face while printing with the interlocks defeated. Is the voltage correct?	No	Check the harness connection between the high-voltage power supply and the driver PCB. If the connection is normal, replace the high-voltage power supply PCB.
Driver PCB failure	9	Perform the same check as step 8 above.	No	Replace the driver PCB.

I-2	Dark

LP

Possible cause	Step	Check	Result	Remedy
Contrast failure	1	Is the contrast adjustment dial at the center click position?	No	Set it to the center click position or reasonable position.
Corona failure (soiled wire)	2	Is the corona wire soiled?	Yes	Clean the corona wire.
Corona failure (contact failure)	3	Are the corona electrodes between the printer body (bottom plate spring) and drum unit soiled? Is the bottom plate spring normal?	No	Clean both electrodes. If the spring is abnormal, replace it.
Drum unit failure	4	Is the problem solved when the drum unit is replaced?	Yes	Replace the drum unit with a new one.

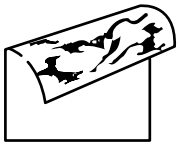
I-3	Completely blank

Possible cause	Step	Check	Result	Remedy
Developing bias contact failure	1	Are the developing bias contacts between the printer body and drum unit soild ?	Yes	Clean the electrodes at both sides.
Scanner harness connection failure	2	Is the scanner LD control harness connected normally? Is there any play in the connection?	Yes	Connect the connector correctly.
Main/driver PCB connection failure	3	Are printing signals being input to the scanner?	No	Replace the main PCB or driver PCB.

I-4	All black

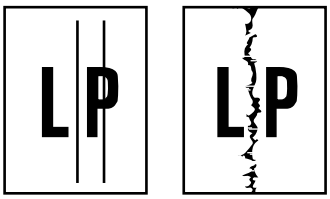
Possible cause	Step	Check	Result	Remedy
Corona failure	1	Is the drum unit corona wire broken?	Yes	Replace the drum unit.
Ditto	2	Are the charging terminal spring at the printer body side and the electrode on the bottom face of the drum unit, dirty?	Yes	Clean the charging wire at the both sides.
Ditto	3	When printing is performed with the interlocks defeated, is the specified voltage measured at the charging spring at the printer body side ?	No	Check the connection of the harness between the high-voltage power supply and the driver PCB.
Ditto	4	Perform the same check as step 3.	No	Replace the driver PCB.

I-5	Dirt back of paper



Possible cause	Step	Check	Result	Remedy
Soiled fixing unit	1(A)	Is the area of about 50mm from the top on the back of paper soiled?	Yes	Replace the drum unit.
	1(B)	Is other area rather than the above soiled?	Yes	Replace the fixing unit.
Soiling of the transfer roller	2	Is the transfer roller soiled?	Yes	Replace the drum unit.
Fogging	3	Is the back of the paper fogged?	Yes	See item 1-2.

I-6	Black vertical streaks	Black and blurred vertical stripes



Possible cause	Step	Check	Result	Remedy
Drum unit failure	1	Is the vertical streak about 1 ~ 5 length at 94mm internals?	Yes	Replace the drum unit.
Soiling of the paper feed system	2	Is the paper tray or feed system on the drum unit soiled with toner?	Yes	Clean the toner off.
Corona failure	3	Has the corona wire cleaner failed to return to its home position? Are each area around 10mm from the both side of paper soiled with faint black streaks?	Yes	Return the wire cleaner to its home position.
Corona failure	4	Is the corona wire soiled?	Yes	Clean the corona wire.
Scratch on the drum	5	Is the surface of the drum scratched?	Yes	Replace the drum unit.
Cleaning failure	6	Is the drum surface soiled is streakily?	Yes	Replace the drum unit.
Scratch on the fixing unit	7	Is the drum surface still soiled streakily even after replacing the drum unit?	Yes	Replace the fixing unit.

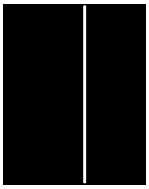
I-7	Black and blurred horizontal stripes

Possible cause	Step	Check	Result	Remedy
Scratch on the drum	1	The horizontal stripes at 94 mm intervals?	Yes	Replace the drum unit
Toner stuck on the sleeve	2	The horizontal stripes at 45 mm intervals?	Yes	Print several sheets and see what happens. The problem will be cured itself after a while.
Scratch on the fixing roller	3	The horizontal streaks at 64 mm intervals?	Yes	Replace the fixing unit.

I-8	Dropout

Possible cause	Step	Check	Result	Remedy
Transfer failure	1	Is the pressure spring of the upper shoot cover come off?	Yes	Re-fit the spring.
			No	Replace the drum unit.
High-voltage power supply failure	2	Remove the main cover and measure the voltage at the transfer electrode plate at the right side while printing with the interlocks defeated. Is the voltage correct?	Yes	Check the harness connection between the high-voltage power supply and the driver PCB. If the connection is normal, replace the high-voltage power supply PCB.

I-9	White vertical streaks

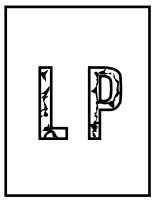


Possible cause	Step	Check	Result	Remedy
Scanner soiling	1	Is the window of scanner soiled?	Yes	Clean the window with a dry tissue.
			No	Replace the tdrum unit as the transfer roller may be scratched.

I-10	Faulty registration

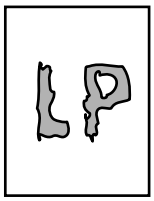
Possible cause	Step	Check	Result	Remedy
Excessive paper load	1	Is the amount of paper more than 22mm thick (in thickness) loaded to the paper tray?	Yes	Instruct the user to keep paper loads below 22 mm in thickness.
Print paper	2	Is the specified weight of the recommended paper being used?	No	Instruct the user to use the recommended types of paper.
	3	Is the first printing position within ±1mm of the tolerance specification?	Yes	Adjust the Y offset by using the utility software supplied.
Top of form sensor position failure	4	Is the position of the top of form sensor normal?	No	Reposition the sensor to the normal position.

I-11	Poor fixing



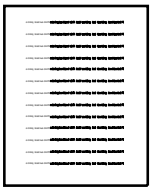
Possible cause	Step	Check	Result	Remedy
Printing paper	1	Is thick paper more than 36 lb. being used?	Yes	Instruct the user to use paper of the recommended thickness.
Toner sensing failure	2	Is the problem solved by replacing the drum unit or the toner cartridge? (When printing is faint.)	Yes	The carrier of the developer is leaking. As toner sensing is defective, clean the toner sensor. If the wiper of the toner cartridge is broken, replace the toner cartridge with a new one.
Fixing unit nip failure	3	Is the nip width in the fixing unit insufficient? Is the nip release arm (joined to the top cover) connected?	Yes	Correct the nip release arm to normal.
Thermistor failure	4	Measure the temperature of heater surface during printing. Is the temperature correct (150 °C) ?	No	Replace the fixing unit.

I-12	Image distortion



Possible cause	Step	Check	Result	Remedy
Scanner	1	Is the scanner unit secured to the frame normally? Is there any play?	Yes	Secure the unit normally with the screws.
Scanner LD emission failure Scanner motor rotation failure	2	Is the laser potion or the scanner motor defective?	Yes	Replace the scanner unit.
Scanner connection failure	3	Is the scanner harness connected normally? Is it coming loose?	Yes	Connect the harness tightly.

I-13	Blurred at either side



Possible cause	Step	Check	Result	Remedy
Leaning of the printer	1	Is the printer placed horizontally?	No	Place the printer on a flat table.
Drum unit	2	Is the problem happened just after replacing the drum unit with a new one?	Yes	Remove the drum unit, hold the unit horizontally and tap it against a flat table 3-4 times.

3. TROUBLESHOOTING OF MALFUNCTIONS

When carrying out the countermeasures for malfunctions described in this section, make sure to check connectors for contact failure before measuring the voltage at specified connector pins.

M-1	No AC power supplied

Possible cause	Step	Check	Result	Remedy
Supply voltage	1	Is the correct voltage present at the outlet?	No	Inform the user that the correct voltage is not supplied at the outlet.
Power plug	2	Is the power cord securely plugged into the outlet?	No	Plug the power cord securely into the outlet.
Fuse (F1)	3	Is the fuse blown?	Yes	If the fuse blows again immediately after replacing the fuse or plugging in the power cord, check if there is a short circuit somewhere in the AC power supply line.
Wiring	5	Unplug the power supply plug. Is there a broken wire between the AC input connector of the low-voltage power supply and the power plug?	Yes	Replace the AC power cord.

M-2	No DC power supplied

<table>
<tr><th>Possible cause</th><th>Step</th><th>Check</th><th>Result</th><th>Remedy</th></tr>
<tr><td>AC power supply</td><td>1</td><td>Is AC power supplied between connectors CN1-L and CN1-N when the power plug is plugged into the outlet?</td><td>No</td><td>Follow the same check procedure of M-1 "No AC power supplied".</td></tr>
<tr><td>Wiring,
DC load</td><td rowspan="2">2</td><td rowspan="2">Turn the power switch OFF and disconnect the P2 connector (driver PCB).
Turn the micro switch on the power supply PCB ON and measure the voltages between the terminals.
Do the measured voltage satisfy the prescribed value in the table below?
<table>
<tr><th>PCB</th><th>+ lead pin</th><th>- lead pin</th><th>Voltage</th></tr>
<tr><td rowspan="4">Driver</td><td>P2-1</td><td>P2-4</td><td>Approx. 24 V</td></tr>
<tr><td>P2-3</td><td>P2-5</td><td>Approx. 24 V</td></tr>
<tr><td>P2-8</td><td>P2-6</td><td>Approx. 5 V</td></tr>
<tr><td>P2-10</td><td>P2-6</td><td>Approx. 5 V</td></tr>
</table></td><td>Yes</td><td>Turn the power switch OFF, connect the connector disconnected, and turn the power switch ON again.
If the protector circuit is activated, check the connector, the wiring from the connector, and the DC load.</td></tr>
<tr><td>Power supply input unit</td><td>No</td><td>Replace the power supply input unit.</td></tr>
</table>

M-3 Main motor unrotated

<table>
<tr><th>Possible cause</th><th>Step</th><th>Check</th><th>Result</th><th>Remedy</th></tr>
<tr><td>Connection failure of connector</td><td>1</td><td>Is the connection of connector P3 on the driver PCB correct?</td><td>No</td><td>Reconnect the connector.</td></tr>
<tr><td>Main motor (M1)</td><td rowspan="2">2</td><td rowspan="2">Disconnect connector P3 from the driver PCB.
Measure the resistance between the connector J210 pins of the main motor by using a circuit tester.
Do the measured resistance satisfy the prescribed value in the table below?
<table><tr><td>P3-1 and P3-2</td><td>Approx. 13 Ω</td></tr><tr><td>P3-3 and P3-2</td><td>Approx. 13 Ω</td></tr><tr><td>P3-4 and P3-5</td><td>Approx. 13 Ω</td></tr><tr><td>P3-5 and P3-6</td><td>Approx. 13 Ω</td></tr></table></td><td>No</td><td>Replace the Main motor</td></tr>
<tr><td>Driver circuit</td><td>Yes</td><td>Replace the driver PCB.
Replace the Main PCB.</td></tr>
</table>

M-4 No paper supplied

<table>
<tr><th>Possible cause</th><th>Step</th><th>Check</th><th>Result</th><th>Remedy</th></tr>
<tr><td>Connection failure of connector</td><td>1</td><td>Is the contact of connector P9 on the driver PCB good?</td><td>No</td><td>Reconnect the connector.</td></tr>
<tr><td>Driver circuit</td><td rowspan="2">2</td><td rowspan="2">Set paper on the manual paper tray and press the test print button on the operation panel.
Does the voltage between pins 4 (PICKUP) and 1 (GND) of the P9 connector on the driver PCB change from approx. 24 VDC to 0 V within the specified time?</td><td>No</td><td>Replace the driver PCB.</td></tr>
<tr><td>Paper pick-up clutch solenoid (SL501)</td><td>Yes</td><td>Replace the paper pick-up solenoid.</td></tr>
</table>

M-5	Insufficient output from high-voltage power supply unit

Possible cause	Step	Check	Result	Remedy
High voltage contact	1	Do any of the terminals on the high-voltage contact have soiling or contact burns?	Yes	Clean the high-voltage contact.
High-voltage power supply failure	2	Remove the main cover and measure the voltage at each of the high-voltage terminal plates at the right side. Is the specified voltage measured?	No	Check the connection of the harness between the high-voltage power supply and the driver PCB. If normal, replace the high-voltage power supply PCB.

M-6	Fixing heater temperature not adjusted

Possible cause	Step	Check	Result	Remedy
Poor thermistor harness contact	1	Is the connection of the connectors on the paper eject sensor PCB and the driver PCB correct?	No	Connect the connectors securely.
Blown thermal fuse	2	Remove the fixing unit and measure the resistance between the input connectors. Is it open?	Yes	Replace the fixing unit.
Thermistor failure	3	Is the thermistor installed normally?	No	Replace the fixing unit.

M-7	BD failure

Possible cause	Step	Check	Result	Remedy
Harness connection failure	1	Is the connection of connector P6 on the driver PCB correct?	No	Connect it securely.

M-8	Scanner failure

Possible cause	Step	Check	Result	Remedy
Harness connection failure	1	Is the connection of the scanner motor connector and connector P7 on the driver PCB correct?	No	Connect the connectors securely.
Power supply input @	2	Is the voltage between pins 5 (+24 VDC) and 4 (GND) of connector P7 on the driver PCB measured 24 VDC?	No	Check if +24 VDC is supplied between pins 1 (+24 VDC) and 3 (GND) of connector P2 on the driver PCB. If not, check the power supply input.
			Yes	Replace the scanner block.

F-1 Double feeding

Possible cause	Step	Check	Result	Remedy
Paper	1	Is the paper of a recommended type used?	No	Instruct the user to use the recommended types of paper.
Separation pad	2	Is the surface of the separation pad worn?	Yes	Replace the multi-purpose tray.

F-2 Wrinkles

Possible cause	Step	Check	Result	Remedy
Paper	1	Is the paper of a recommended type used?	No	Instruct the user to use the recommended types of paper.
	2	Is the wrinkle problem solved if a new paper is used?	Yes	Instruct the user how to store paper so that it does not absorb moisture.
Paper pick-up block	3	After paper feeding, open the left cover just before the paper is fed to the fixing unit. At this time, check if the paper is wrinkled or being skewed.	Yes	Check the paper pick-up block.
Fixing unit entrance guide	4	Is the entrance guide soiled?	Yes	Clean the entrance guide.
Fixing unit	5	Are there still any wrinkles aftrer printing several blank pages?	Yes	Replace the fixing unit as the lower fixing roller may be soiled.

4. INSPECTION MODE

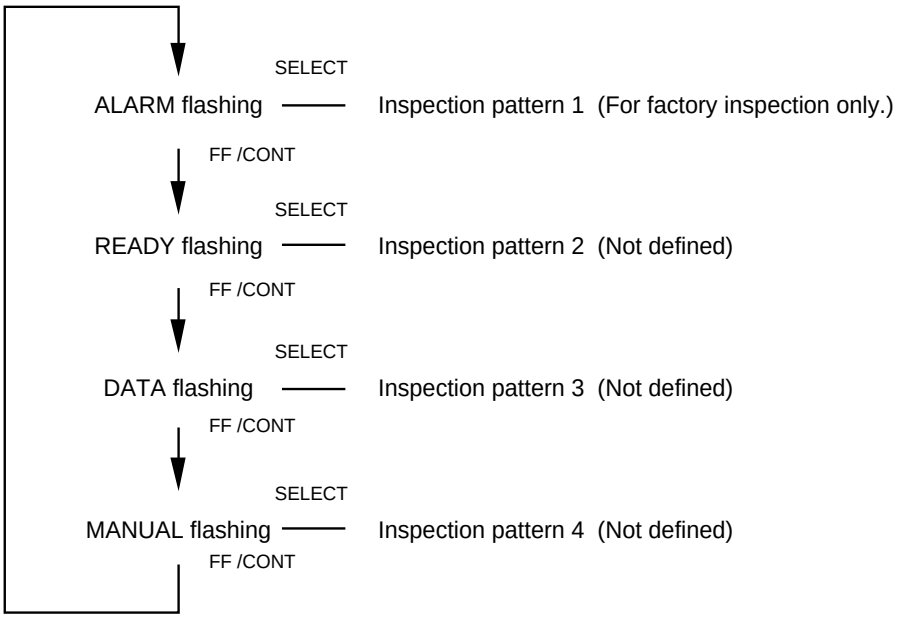
The following inspection modes are incorporated in the printer.

4.1 Inspection Mode 1

When the power code is plugged into the outlet while holding down the FF/CONT button, the printer goes to the inspection mode.

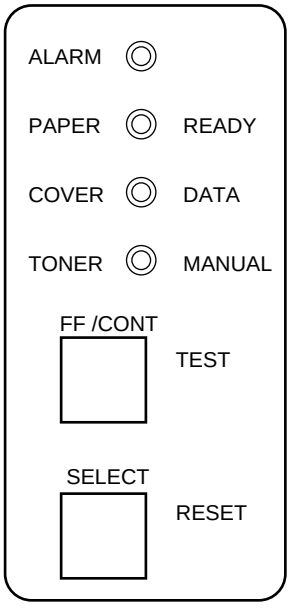
Immediately after entering this mode the ALARM LED starts to flash.

Every time the FF/CONT button is pressed, LED flushing position passes on the next. The following inspection pattern are assigned to the respective LED. By pressing the SELECT button the currently selected inspection mode comes into effect.



4.2 Inspection Pattern 1

This is for the program used for inspection in the factory.
It is used to cheek if the printer's sensors are functioning correctly, after then this test printing is performed.



On entering this inspection mode, the LEDs show the statuses of the respective sensors.

ALARM LED

Indicates the status of the paper eject sensor:
ON : Paper exist on the paper eject part.
OFF: No paper exist on the paper eject part.

PAPER LED

Indicates the status of the registration sensor:
ON : The registration sensor is ON.
OFF: The registration sensor is OFF.

COVER LED

Indicates the status of the cover switch:
ON : The cover is open or the sheet feeder is not installed.
OFF: The cover is closed and the sheet feeder is installed.

TONER LED

Indicates the status of the toner empty sensor:
ON : The toner cartridge is not installed or the toner is almost empty in it.
OFF: The toner cartridge is installed.

If the SELECT switch is pressed while all the LEDs are ON, the test printing pattern for the inspection is printed in three pages.

The inspection procedure is as follows:

(1) Inspection will be started when:

No sheet feeder is installed.

No drum unit is installed.

No toner cartridge is installed.

The top cover is open.

(2) Plug the power plug into the outlet while holding down the FF/CONT button.

(3) The ALARM LED will start to flash.

(4) Press the SELECT button. Inspection pattern 1 will start.

(5) Check if all the LEDS light once and then the ALARM and PAPER LEDs go OFF.
If the paper eject sensor is ON at this time, the ALARM LED will be ON (error).
If the registration sensor is ON at this time, the PAPER LED will be ON (error).

(6) Pressing down the registration sensor actuator, check if the PAPER LED comes ON.

(7) Install the drum unit.

(8) Install the toner cartridge, and check if the TONER LED goes OFF.

(9) Close the top cover.

(10) Install the sheet feeder, and check if the COVER LED goes OFF.

(11) Check if all the LEDs are OFF.
If all the LEDs are OFF, the sensors are correct.

(12) Set paper in the sheet feeder.

(13) Pressing the SELECT button, three pages of the inspection pattern will be printed.

(14) Power OFF (Unplug the power cord).

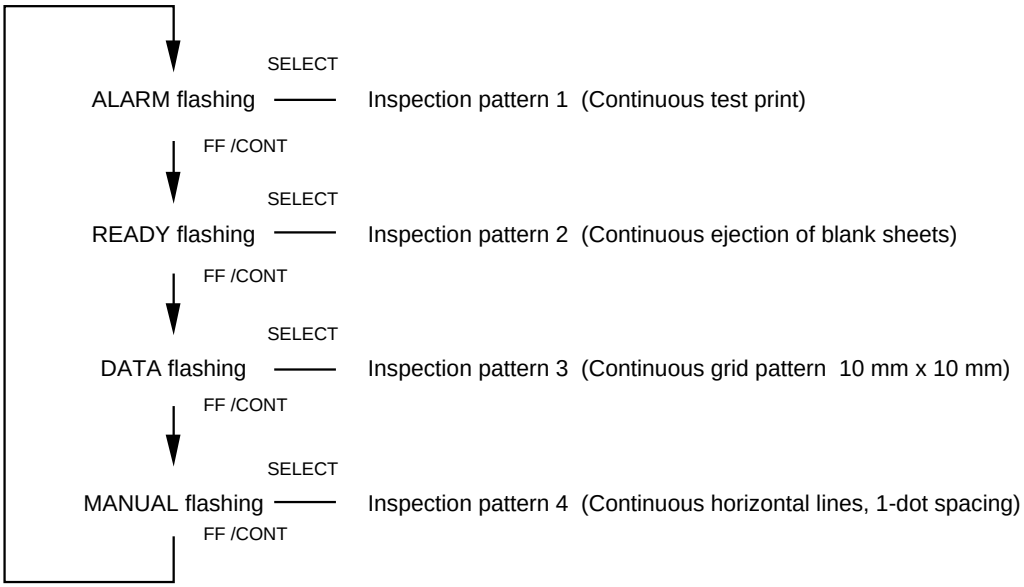
This completes the inspection procedure.

4.3 Inspection mode 2

When the power code is plugged into the outlet while holding down the SELECT button, the printer goes to the inspection mode 2.

Immediately after entering this mode the ALARM LED starts to flash.

Every time the FF/CONT button is pressed, LED flushing position passes on the next. The following inspection pattern are assigned to the respective LED. By pressing the SELECT button the currently selected inspection mode comes into effect.



4.4 Initialization of EFPROM

The EFPROM can be returned to its factory setting by using the remote printer console supplied as an accessory, but the settings indicated below can only be made by using the special utility software:

(1) Initialization of the page counter.

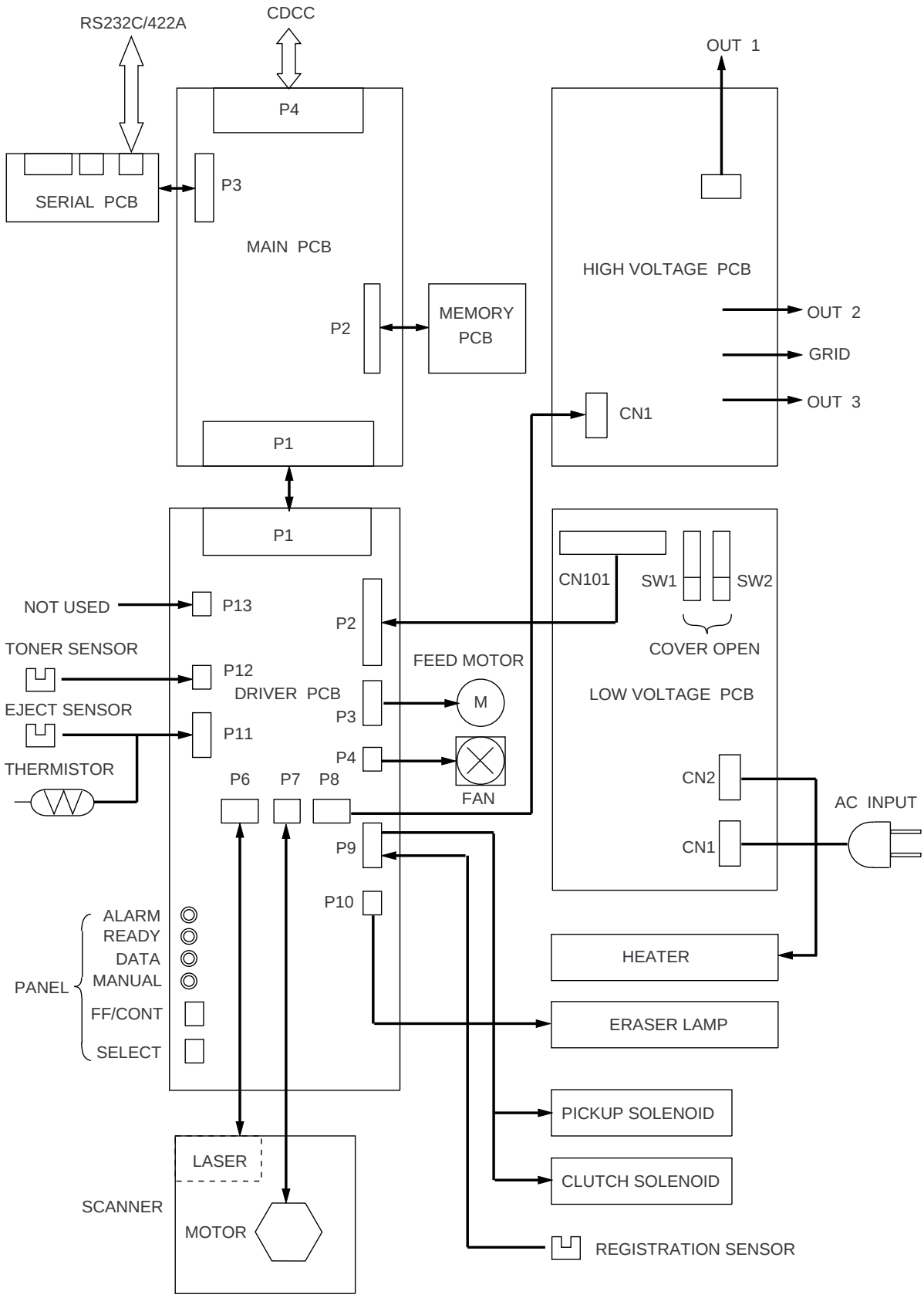
(2) Initialization of the drum life indicator.

Use the utility software for these settings.

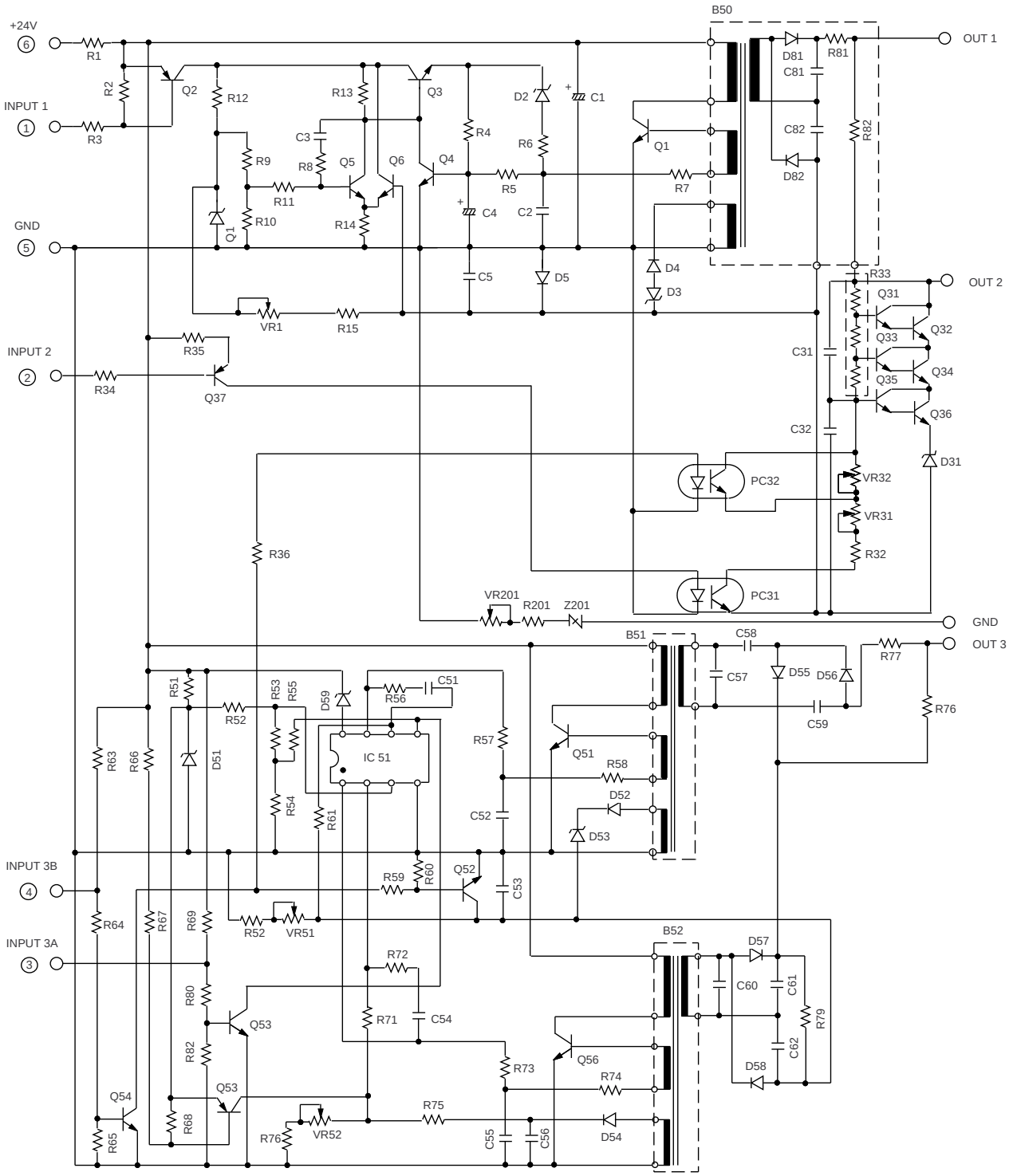
4.5 Error codes

In the event of a printer failure or a printer hang-up, the LEDs will alternate between all LED ON and displaying a specific combination of ON and OFF, which indicates the types of the failure. The types of failure and LED combinations are as follows.

Type of failure	MANUAL	DATA	READY	ALARM	
Fixing unit failure				●	
Laser scanner BD signal not detected			●		— Go to "cover open"
ROM failure		●			
DRAM failure		●		●	
SERVICE A		●	●		┐
SERVICE B		●	●	●	│
SERVICE C	●				│
SERVICE D	●			●	│ CPU hang up
SERVICE E0	●		●		│
SERVICE E1	●		●	●	│
SERVICE P	●	●			│
NV-RAM failure	●	●		●	┘

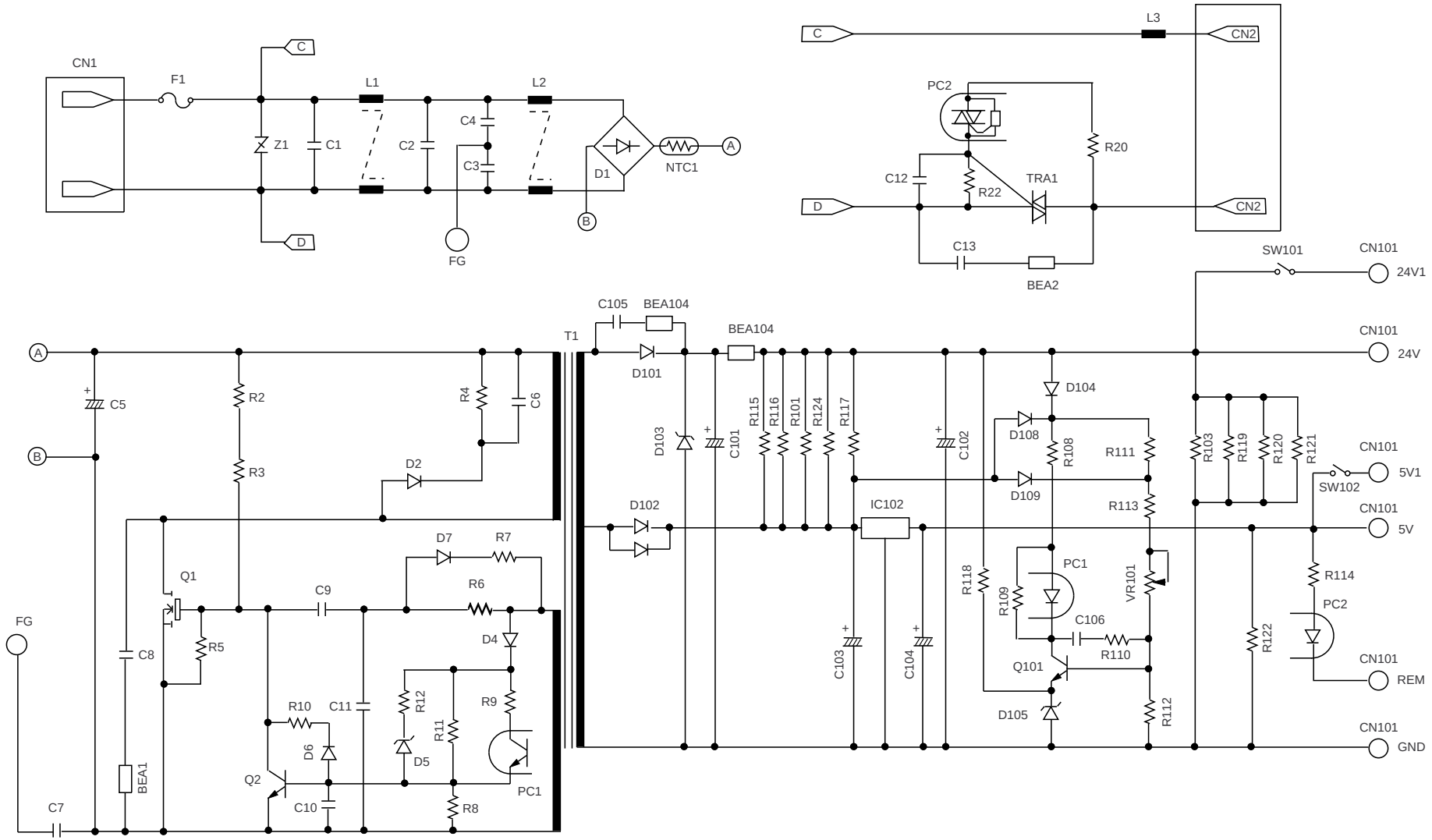


General Block Diagram

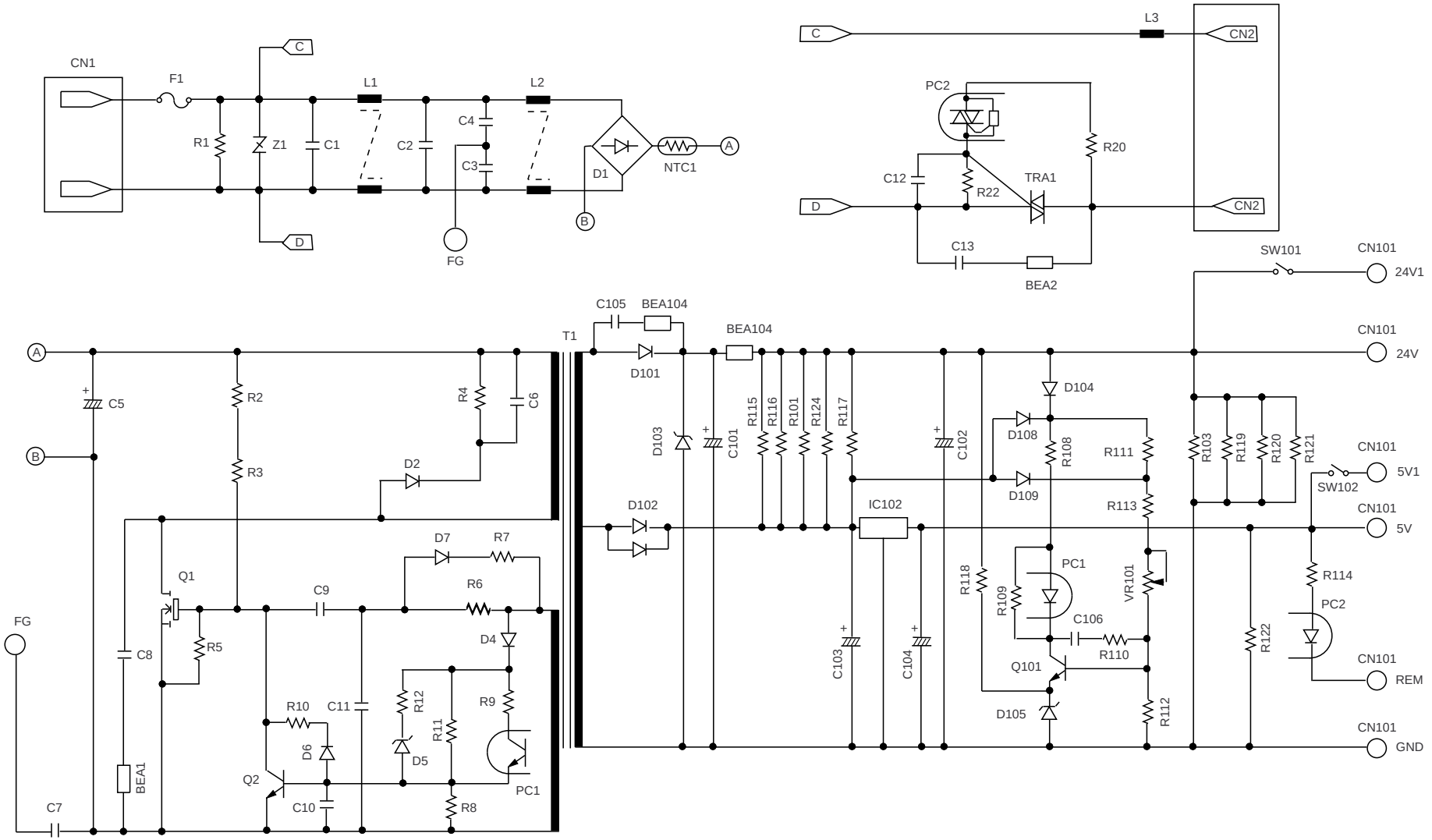


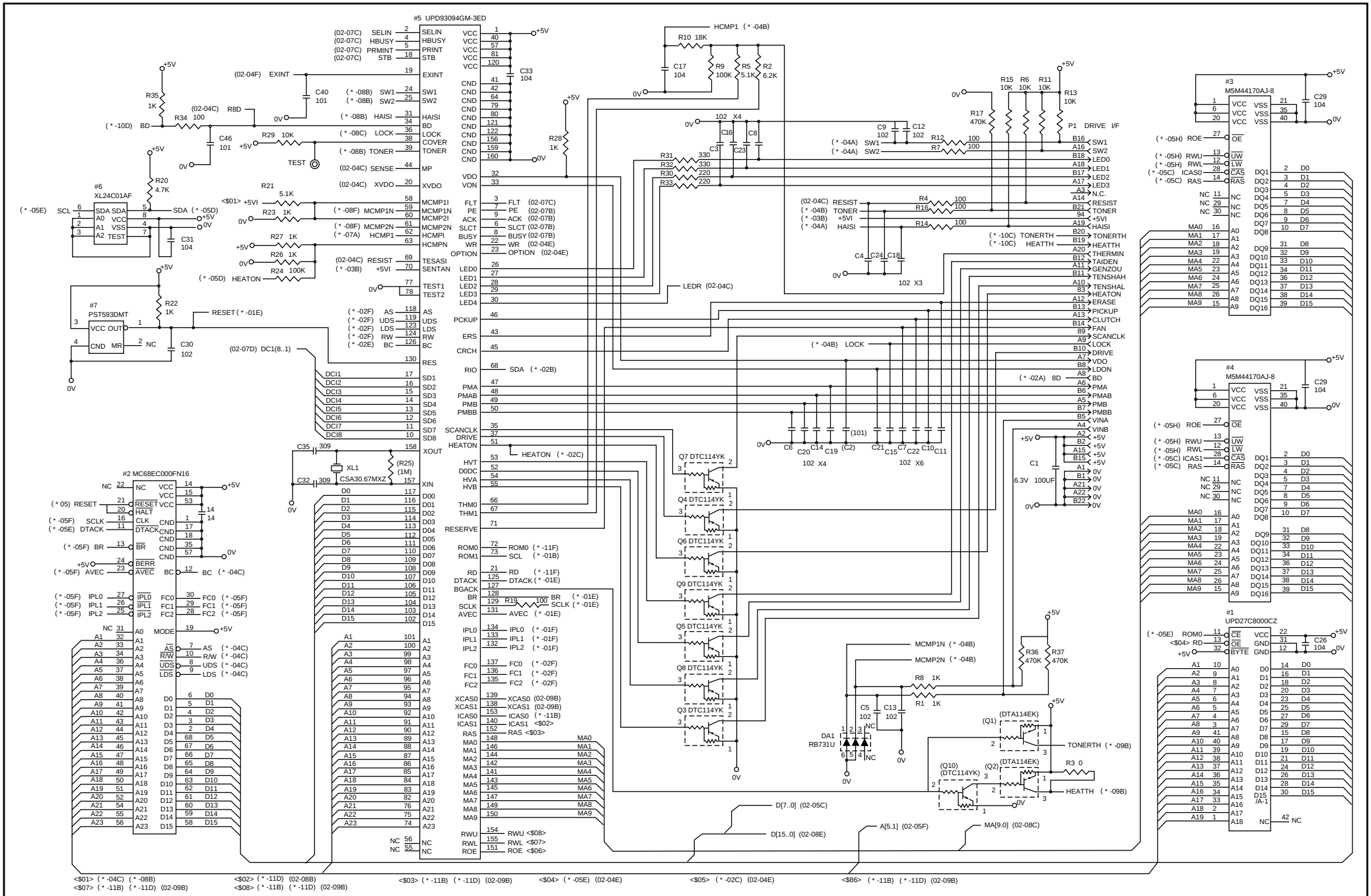
HL-XL High-Voltage PS Circuit

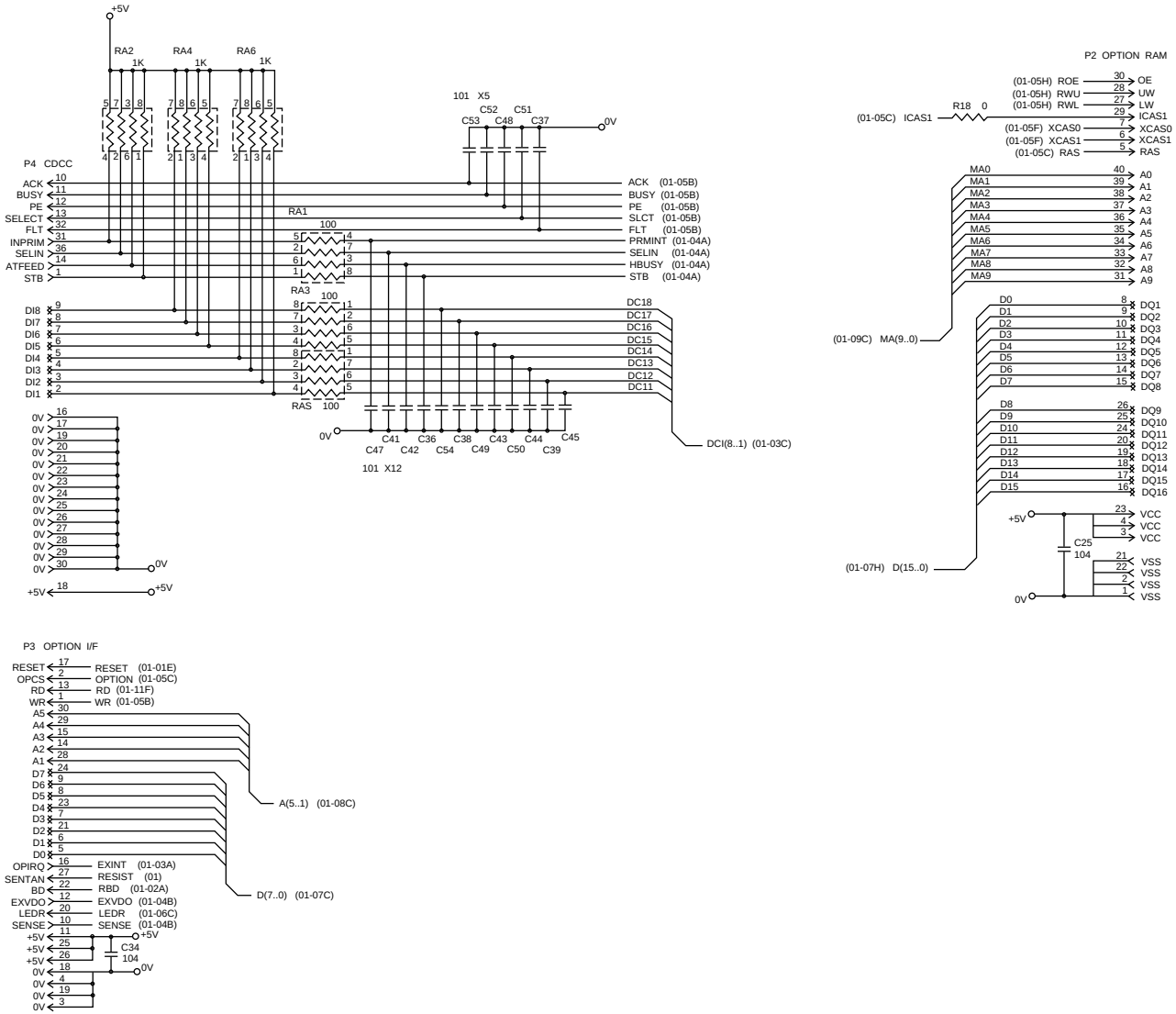
HL-XL Low-Voltage PS Circuit, 115V



HL-XL Low-Voltage PS Circuit, 230V

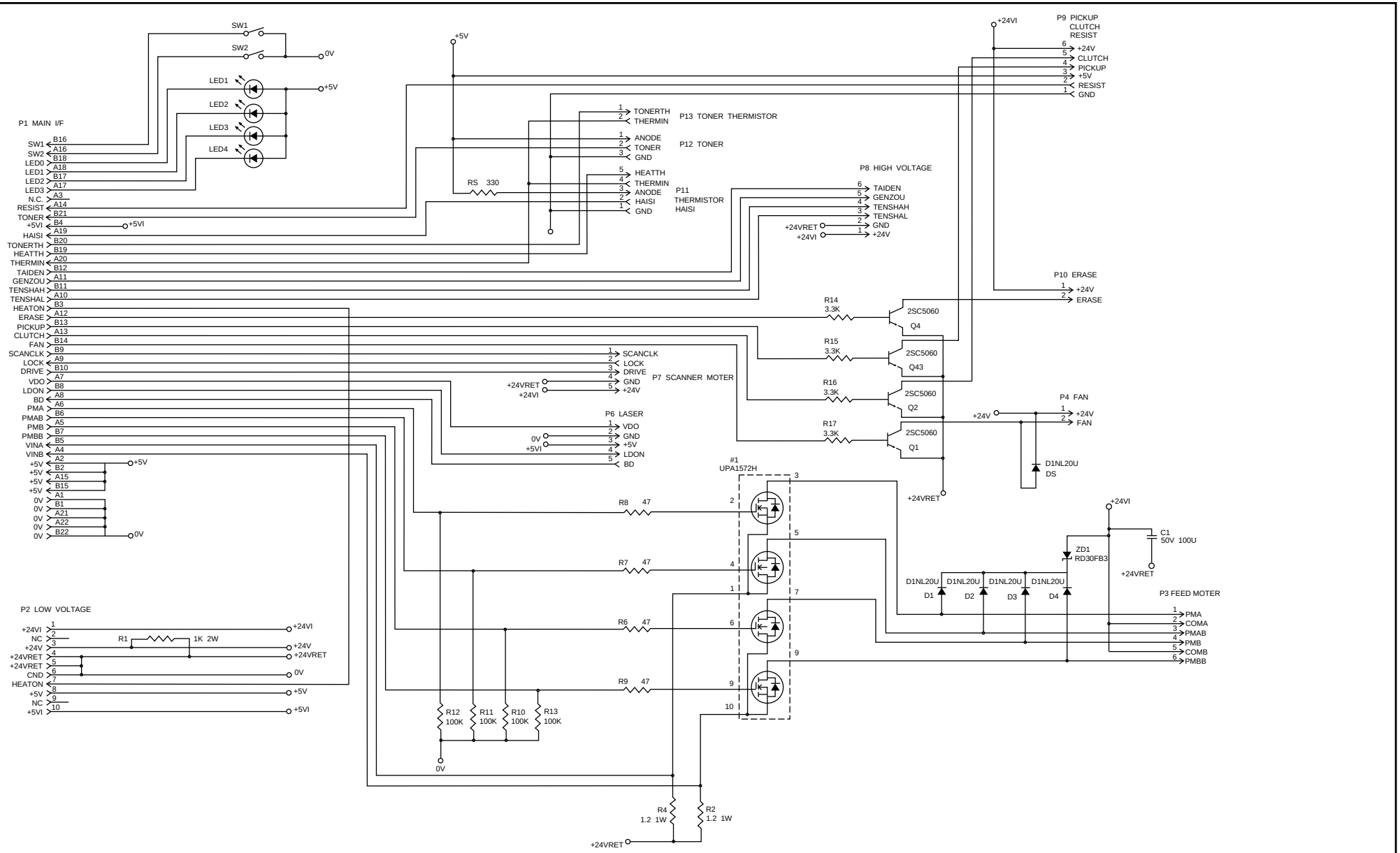



#5 UPD93094GM-3ED
#2 MC68EC000FN16
#3 M5M44170AJ-8
#4 M5M44170AJ-8
#1 UPD27C8000CZ
#6 XL24C01AF
#7 PST593DMT
P1 DRIVE I/F
HCMP1 (* -04B)
LEDR (02-04C)
HEATON (* -02C)
LOCK (* -04B)
MCMP1N (* -04B)
MCMP2N (* -04B)
TONERTH (* -09B)
HEATTH (* -09B)
D[7..0] (02-05C)
D[15..0] (02-08E)
A[5.1] (02-05F)
MA[9.0] (02-08C)
Main PCB Circuit Diagram 1



<$01> (01-04C) (01-08B)

Main PCB Circuit Diagram 2



Driver PCB Circuit Diagram

May '94
54U002NE0-HLXL
Printed in Japan

LASER PRINTER

PARTS REFERENCE LIST

HL- 600 Series

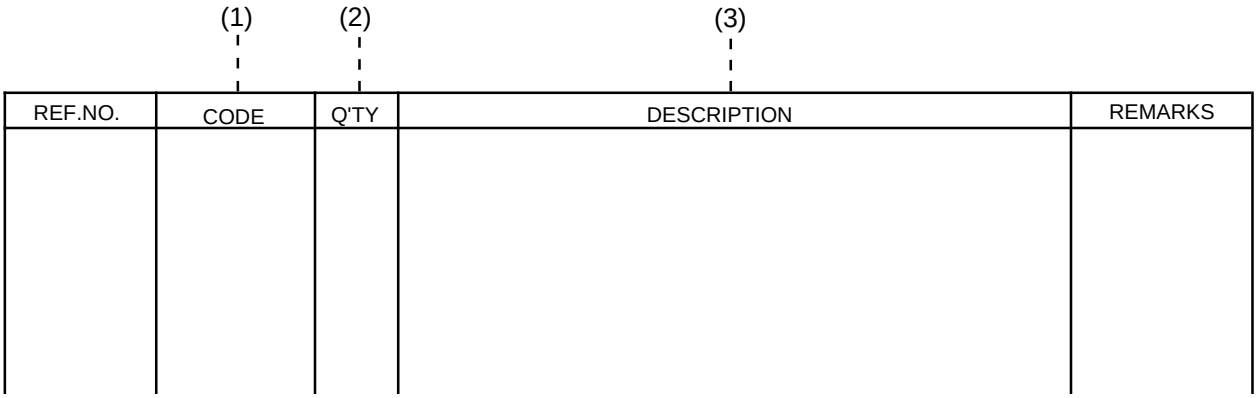
NOTE FOR USING THIS PARTS REFERENCE LIST

1.In the case of ordering parts, it needs mentioning the following items:

(1) Code
(2) Q'ty
(3) Description
(4) Revision No. (for a kind of printed circuit boards)

Note : No orders without Parts Code or Tool No. can be accepted.

< Example >



(5) Revision No. : marked on a printed ciecuit board.

2. Design-changed parts:
If the parts are changed, any one of the following symbols is indicated in the REMARKS column.

#A : compatible between old and new
#B : replaceable from old to new
#D : incompatible
: newly established

3. The original of this list was made based on the information available in September, '94.

4. Parts are subject to change in design without prior notice.

CONTENTS

1. FRAME 2
2. FRAME ATTACHMENT 3
3. SCANNER 3
4. PAPER FEEDER 4
5. PAPER EMPTY 4
6. FIXING UNIT 5
7. CABINET 5
8. MAIN PCB 6
9. DRIVER PCB 6
10. LOW POWER SUPPLY UNIT 7
11. HIGH POWER SUPPLY UNIT 7
12. POWER CORDS 8
13. ATTACHMENTS 8
14. DOCUMENTS 9
15. PACKING 9
16. ADJUSTING KIT 10

Fig.3. POWER CORDS

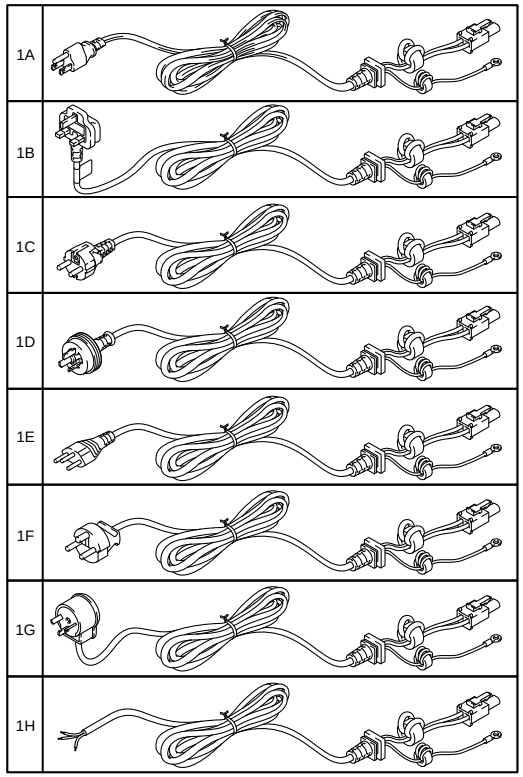


Fig.1. MAIN PCB

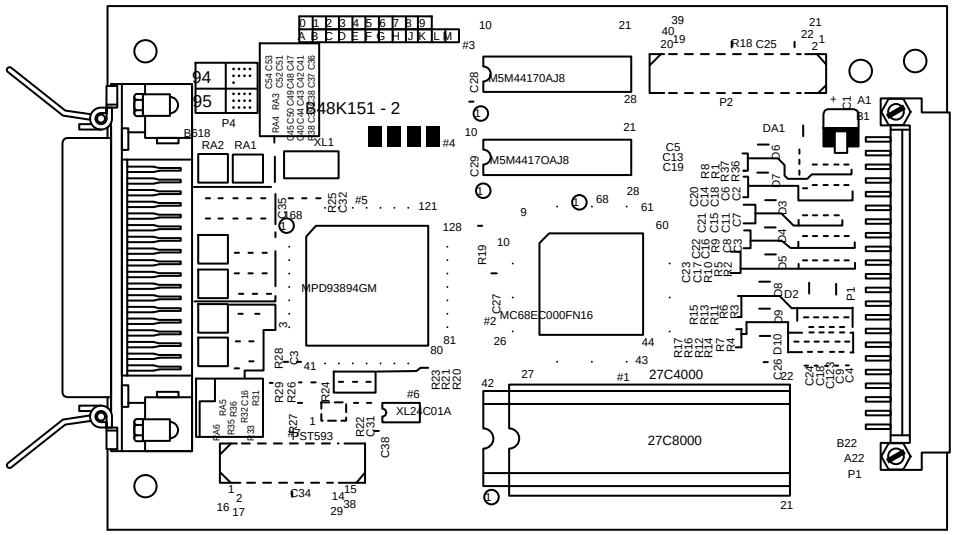
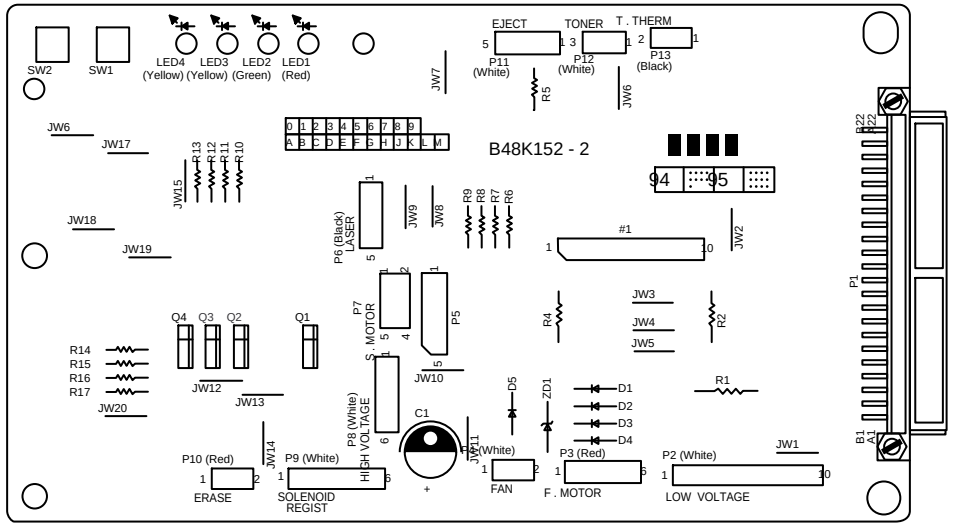
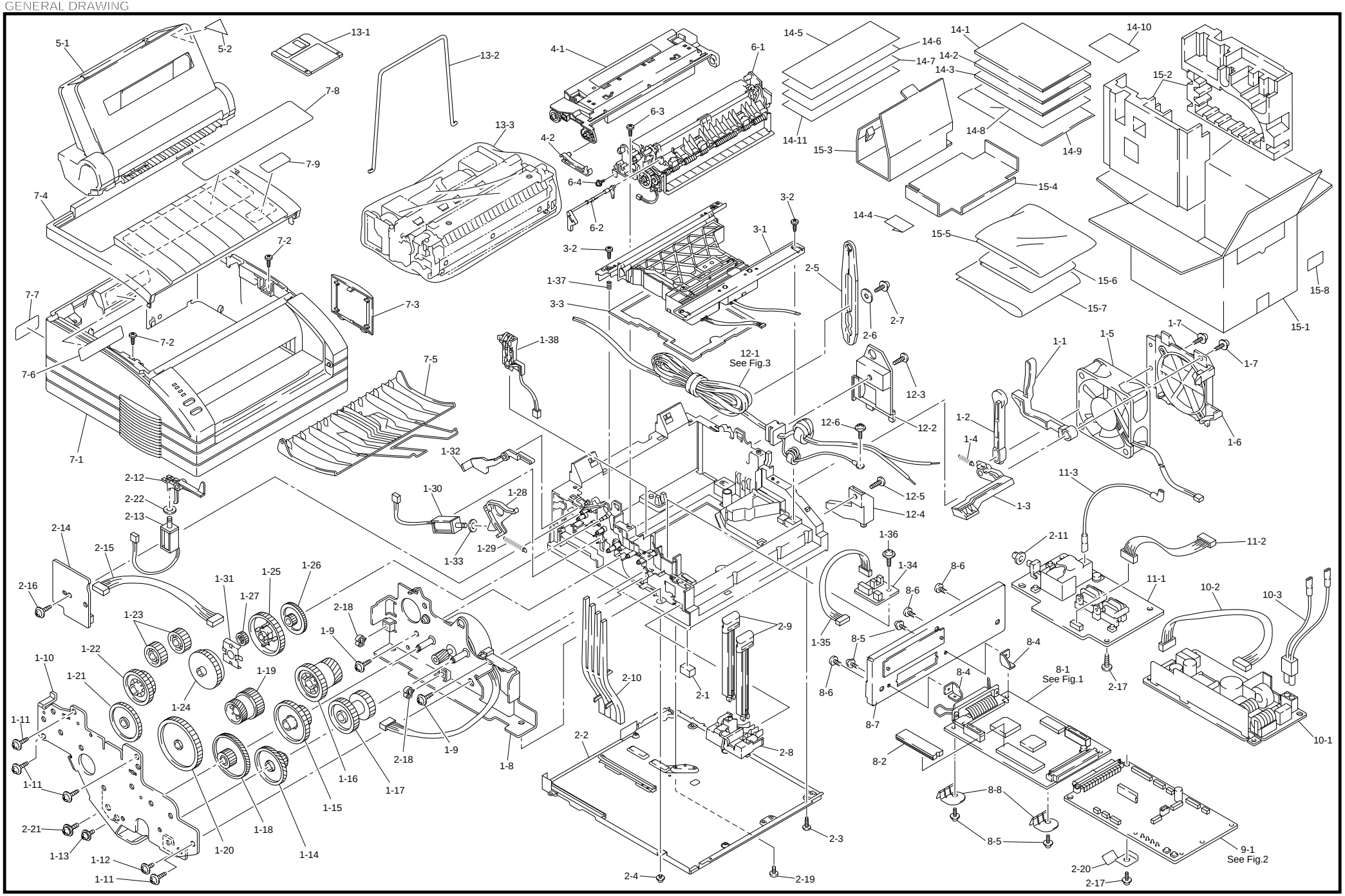


Fig.2. DRIVER PCB





MODEL HL-XL 54U-101

1 . FRAME

REF.NO.	CODE	Q'TY	DESCRIPTION	REMARKS
1	UL5009000	1	INTERLOCK LEVER, CV	
2	UL5011000	1	INTERLOCK LEVER, PENDULUM	
3	UL5012000	1	INTERLOCK LEVER, S	
4	UL5013001	1	SPRING, EXTENSION	
5	UL5008001	1	FAN MOTOR	
6	UL5044000	1	FAN GUARD	
7	087310815	2	TAPTITE, CUP B M3X8	
8	UL5019001	1	MAIN MOTOR UNIT	
9	087310815	2	TAPTITE, CUP B M3X8	
10	UL5025000	1	GEAR SHAFT PLATE	
11	087310616	4	TAPTITE, CUP B M3X6	
12	0A5300605	1	SCREW, PAN (WASHER) M3X6DB	
13	087320616	1	TAPTITE, CUP S M3X6	
14	UL5027000	1	GEAR, 23/66	
15	UL5028000	1	GEAR, 22/63	
16	UL5029000	1	GEAR, 25/40	
17	UL5030000	1	GEAR, 23/37	
18	UL5031000	1	GEAR, 17/78	
19	UL5032000	1	GEAR, 29/38	
20	UL5033000	1	IDLE GEAR, 59	
21	UL5034000	1	GEAR 20/43	
22	UL5035000	1	GEAR, 27/38	
23	UL5036000	2	IDLE GEAR, 24	
24	UL5037000	1	GEAR, 42/60	
25	UL5038000	1	CLUTCH GEAR, 47	
26	UL5039000	1	GEAR, 18	
27	UL5040000	1	CLUTCH GEAR, 21	
28	UL5041000	1	CLUTCH LEVER	
29	UF3056001	1	SPRING, EXTENSION	
30	UL5043001	1	SOLENOID C ASSY	
31	UL5050001	1	SPRING PLATE	
32	UL5087001	1	REGIST SENSOR LEVER	
33	UL5084000	1	RUBBER WASHER 12	
34	UL5024001	1	MOTOR COOLING FILM	
35	UK2151001	1	PAPER EJECT SENSOR PCB ASSY	
36	UK2211001	1	PAPER EJECT SENSOR HARNES ASSY	
37	087310815	1	TAPTITE, CUP B M3X8	
38	UL5015001	1	ERASE LAMP FEEDER HOLDER ASSY	
39	UL5049000	1	SPRINTG, COMPRESSION	

MODEL HL-XL 54U-101-010

2 . FRAME ATTACHMENT

REF.NO.	CODE	Q'TY	DESCRIPTION	REMARKS
1	UL5073001	4	RUBBER FOOT	
2	UL5075001	1	BASE PLATE ASSY	
3	085411015	8	TAPTITE, BIND B M4X10	
4	087320616	1	TAPTITE, CUP S M3X6	
5	UL5269000	1	TOP COVER LINK	
6	UL5270001	1	WASHER	
7	085411015	1	TAPTITE, BIND B M4X10	
8	UL5082000	1	SWITCH LEVER	
9	UL5083001	2	SWITCH KEY	
10	UL5085000	1	PANEL RIGHT GUIDE	
11	UL5086003	1	CONCENTRATION DIAL, GRAY(1252)	
12	UL5088000	1	SOLENOID LEVER	
13	UL5090001	1	SOLENOID P ASSY	
14	UK2154001	1	REGIST SENSOR PCB ASSY P	
15	UK2206001	1	REGIST SENSOR HARNESS ASSY	
16	087310815	1	TAPTITE, CUP B M3X8	
17	085411015	3	TAPTITE, BIND B M4X10	
18	UF0245000	2	MINI CLAMP	
19	000400606	2	SCREW, PAN BIND M4X6	
20	UL5095000	1	DRIVER EARTH PLATE SPRING	
21	0A5401006	1	SCREW, PAN (WASHER) M4X10DB	
22	UL5094000	1	RUBBER BUSHING	

MODEL HL-XL 54U-101-015

3 . SCANNER

REF.NO.	CODE	Q'TY	DESCRIPTION	REMARKS
1	UL5535001	1	SCANNER UNIT (SP)	
2	085411015	4	TAPTITE, BIND B M4X10	
3	UL5134001	1	SPONGE	

MODEL HL-XL 54U-101-020

4 . PAPER FEEDER

REF.NO.	CODE	Q'TY	DESCRIPTION	REMARKS
1	UL5145001	1	UPPER SHOOT COVER ASSY	
2	UL5161000	1	RELEASE LINK	

MODEL HL-XL 54U-101-030

5 . PAPER TRAY

REF.NO.	CODE	Q'TY	DESCRIPTION	REMARKS
1	UL5542001	1	MP TRAY ASSY (SP)	
2	UL5738003	1	R-PAPER SETTING LABEL	

MODEL HL-XL 54U-101-040

6 . FIXING UNIT

REF.NO.	CODE	Q'TY	DESCRIPTION	REMARKS
1	UL5536001	1	FIXING UNIT, 115V (SP)	
1	UL5537001	1	FIXING UNIT, 230V (SP)	
2	UL5250001	1	PAPER EJECT ACTUATOR, BLACK	
3	087411216	2	TAPTITE, CUP B M4X12	
4	087320616	1	TAPTITE, CUP S M3X6	

MODEL HL-XL 54U-101-050

7 . CABINET

REF.NO.	CODE	Q'TY	DESCRIPTION	REMARKS
1	UL5267001	1	MAIN COVER, GRAY1227	
2	087411216	4	TAPTITE, CUP B M4X12	
3	UL5278001	1	FILTER COVER ASSY, GRAY1227	
4	UL5268001	1	TOP COVER, GRAY1227	
5	UL5271001	1	PAPER EJECT TRAY ASSY	
6	UL5277001	1	SET LABEL	
7	UH0905001	1	PATENT LABEL HL10	
8	UL5276001	1	MYLAR LABEL 630, US	
8	UL5481001	1	MYLAR LABEL 645, US	
8	UL5482001	1	MYLAR LABEL 655M, US	
8	UL5483001	1	MYLAR LABEL 645, CAN	
8	UL5484001	1	MYLAR LABEL 641, US	
8	UL5505001	1	MYLAR LABEL 650, US	
8	UL5516001	1	MYLAR LABEL 630, CAN	
8	UL5549001	1	MYLAR LABEL 641, CAN	
9	UL5064001	1	MODEL PLATE 630	
9	UL5065001	1	MODEL PALTE 631	
9	UL5066001	1	MODEL PLATE 641	
9	UL5067001	1	MODEL PLATE 645	
9	UL5068001	1	MODEL PLATE 650	
9	UL5069001	1	MODEL PLATE 655M	

MODEL HL-XL 54U-101-060

8 . MAIN PCB

REF.NO.	SYMBOL	CODE	Q'TY	DESCRIPTION	REMARKS
1	B48K151-300F	UK2609001	1	MAIN PCB ASSY (SP)	
1	B48K151-301D	UK2610001	1	MAIN PCB ASSY, 1M (SP)	
1	B48K151-304B	UK2611001	1	MAIN PCB ASSY, HEB (SP)	
1	B48K151-302D	UK2612001	1	MAIN PCB ASSY, DEMO 0.5M (SP)	
1	B48K151-303D	UK2613001	1	MAIN PCB ASSY, DEMO 1M (SP)	
2		UK2616000	1	MASK ROM:534200B	
2		UK2183000	1	EPROM 27C4000	
2		UK2617000	1	MASK ROM:TC538200AP	
3		UL5091000	2	PCB ANGLE	
4		087320616	4	TAPTITE, CUP S M3X6	
5		000400606	3	SCREW, PAN BIND M4X6	
6		UL5079001	1	I/F SHIELD ASSY	
7		UL5097000	1	I/F GROUND PLATE SPRING	

MODEL HL-XL 54U-101-101

9 . DRIVER PCB

REF.NO.	SYMBOL	CODE	Q'TY	DESCRIPTION	REMARKS
1	B48K152-300D	UK2614001	1	DRIVER PCB ASSY (SP)	

MODEL HL-XL 54U-101-151

10 . LOW POWER SUPPLY UNIT

REF.NO.	CODE	Q'TY	DESCRIPTION	REMARKS
1	UL5539001	1	PS PCB ASSY, 115V (SP)	
1	UL5540001	1	PS PCB ASSY, 230V (SP)	
2	UK2212001	1	LV HARNESS P ASSY	
3	UL8074001	1	HEATER HARNESS ASSY	

MODEL HL-XL 54U-101-200, 201

11 . HIGH POWER SUPPLY UNIT

REF.NO.	CODE	Q'TY	DESCRIPTION	REMARKS
1	UL5541001	1	HIGH-VOLTAGE PS ASSY (SP)	
2	UK2208001	1	HV HARNESS P ASSY	
3	UL8077001	1	GHG HARNESS ASSY	

MODEL HL-XL 54U-101-220

12 . POWER CORDS

REF.NO.	CODE	Q'TY	DESCRIPTION	REMARKS
1A	UL8078001	1	AC CORD ASSY, US-X	
1B	UK2118001	1	AC CORD ASSY, UK	
1C	UK2114001	1	AC CORD ASSY, EUR VDE	
1D	UK2135001	1	AC CORD ASSY, SAA	
1E	UK2116001	1	AC CORD ASSY, SEV	
1F	UK2146001	1	AC CORD ASSY, DEMKO	
1G	UK2137001	1	AC CORD ASSY, HEB	
1H	UK2602001	1	AC CORD ASSY, S.AF	
2	UL5407000	1	FILTER CLAMP	
3	085411015	1	TAPTITE, BIND B M4X10	
4	UL5408000	1	AC CORD CLAMP	
5	085411015	1	TAPTITE, BIND B M4X10	
6	0A5400605	1	SCREW, PAN (WASHER) M4X6	

MODEL HL-XL 54U-101-230

13 . ATTACHMENTS

REF.NO.	CODE	Q'TY	DESCRIPTION	REMARKS
1	UL5416001	1	PRINTER DRIVER DISK, HL-XL	
1	UL5485001	1	PRINTER DRIVER DISK, EU	
1	UL5487001	1	PRINTER DRIVER DISK, MAC	
2	UL5214000	1	TRAY EXTENSION	

MODEL HL-XL 54U-101-910

14 . DOCUMENTS

REF.NO.	CODE	Q'TY	DESCRIPTION	REMARKS
1	UL5422001	1	USER'S MANUAL, US	
1	UL5426001	1	USER'S MANUAL, GER	
1	UL5427001	1	USER'S MANUAL, FRA	
1	UL5428001	1	USER'S MANUAL, NOR	
1	UL5429001	1	USER'S MANUAL, NL	
2	UL5455001	1	SET GUIDE, US	
2	UL5456001	1	SET GUIDE, GER	
2	UL5457001	1	SET GUIDE, FRA	
2	UL5458001	1	SET GUIDE, NOR	
2	UL5459001	1	SET GUIDE, NL	
3	UL5460001	1	SOFT GUIDE US	
3	UL5461001	1	SOFT GUIDE GER	
3	UL5462001	1	SOFT GUIDE FRA	
3	UL5463001	1	SOFT GUIDE NOR	
3	UL5464001	1	SOFT GUIDE NL	
4	UL5532001	1	WARRANTY CARD, USA	
4	UD0373001	1	WARRANTY CARD, CAN	
4	UH1119001	1	WARRANTY CARD, FRA	
4	237703001	1	WARRANTY CARD, DUTCH	
5	UL5533001	1	SERVICE CARD 2, USA	
6	UH1392001	1	EPA INSERTION SHEET, USA	
7	UL5468001	1	DEMO INSTRUCTION SHEET, US	
8	UE0331001	1	BAG, 215X350H	
9	UL5550001	1	LICENSE SHEET,MAC	
10	UL5261001	1	ACCESSORY ORDER F	
11	UH1236001	1	CAUTION LABEL	

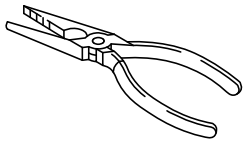
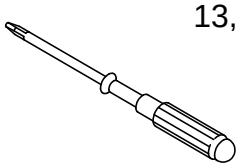
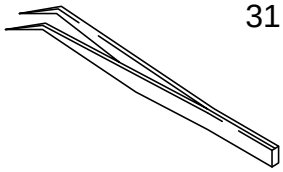
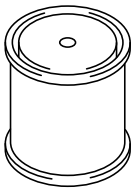
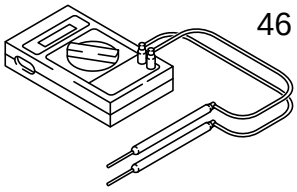
MODEL HL-XL 54U-101-920

15 . PACKING

REF.NO.	CODE	Q'TY	DESCRIPTION	REMARKS
1	UE0303001	1	CARTON, HL-630	
1	UE0304001	1	CARTON, HL-645	
1	UE0305001	1	CARTON, HL-655M	
1	UE0306001	1	CARTON, HL-630D	
1	UE0307001	1	CARTON, HL-645D	
1	UE0308001	1	CARTON, HL-655MD	
1	UE0309001	1	CARTON, HL-630EU	
1	UE0310001	1	CARTON, HL0631EU	
1	UE0311001	1	CARTON, HL-641	
1	UE0328001	1	CARTON, HL-641D	
1	UE0329001	1	CARTON, HL-650	
1	UE0330001	1	CARTON, HL-650D	
1	UE0375001	1	CARTON, HL-641CAN	
1	UE0398001	1	CARTON, HL-645CAN	
2	UE0280001	1	PAD ASSY, HL-6L	
3	UE0283000	1	CARTON, HL-6L DRUM	
4	UE0284000	1	CARTON, HL-6L MANUAL	
5	UE1070001	1	BAG, 700X800H	
6	UE0291001	1	BAG, 300X500H	
7	UE0292000	1	SHEET, 350X700	
8	UL5437001	1	BAR CODE LABEL, 56122US	
8	UL5438001	1	BAR CODE LABEL, 56123US	
8	UL5439001	1	BAR CODE LABEL, 56124US	
8	UL5440001	1	BAR CODE LABEL, 56131US	
8	UL5441001	1	BAR CODE LABEL, 56132US	
8	UL5442001	1	BAR CODE LABEL, 56133US	
8	UL5443001	1	BAR CODE LABEL, 56122EAN	
8	UL5444001	1	BAR CODE LABEL, 56123EAN	
8	UL5445001	1	BAR CODE LABEL, 56140US	
8	UL5508001	1	BAR CODE LABEL, 56137US	
8	UL5509001	1	BAR CODE LABEL, 56138US	
8	UL5510001	1	BAR CODE LABEL, 56139US	

MODEL HL-XL 54U-101-930

16. ADJUSTING TOOL KIT

1 	13,14 	31 
43-N 	46 	

TOOL NO.	TOOL NAME
ZX-1	PLIER (150MM)
ZX-13	SCREW DRIVER PHILIPS (NO.1)
ZX-14	SCREW DRIVER PHILIPS (NO.2)
ZX-31	TWEEZERS (150MM)
ZX-43-N	LUBLICATION GREASE (MOLYKOTE EM30L)
ZX-46	CIRCUIT TESTER

September '94
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Printed in Japan